The Journal
OF THE
Royal United Service Institution.

VOL. XV. 1871. No. LXIII.

LECTURE.

Friday, February 3rd, 1871.

GENERAL EARDLEY WILMOT, R.A., F.R.S., in the Chair.

"PRACTICAL ARTILLERY."

By Captain T. B. STRANGE, R.A.

LAND service artillery may be broadly considered as—

1st. Field.
2nd. Siege.
3rd. Garrison.

The distinctive character of the first is *mobility*, of the last *stability*, or tenacity in holding its ground.

Siege artillery holds an intermediate place between the two.

Artillery instruction may be divided into—

Scientific.
Technical.
Tactical.

I will commence with the last, not treating of drill, which is only a means to an end, or the care of horses, a subject common to cavalry and artillery.

Field Artillery Tactics.

One of the noblest peculiarities of the Prussian Army is its power of self-criticism, not necessarily self-depreciation.

In the French "conferences militaires," just before the present war, we find little but self-satisfaction. In the Prussian retrospect of 1866 we have sharp censure, especially upon the artillery and engineer services. The Prussian artillery, rightly believing in long range and the inadvisability of closing with musketry fire, fell into the opposite error, and got too far to the rear to support their infantry; six of their pieces burst, their fuzes were bad, and their fire was less efficient than that of the Austrian gunners, who sacrificed themselves to save a broken infantry.

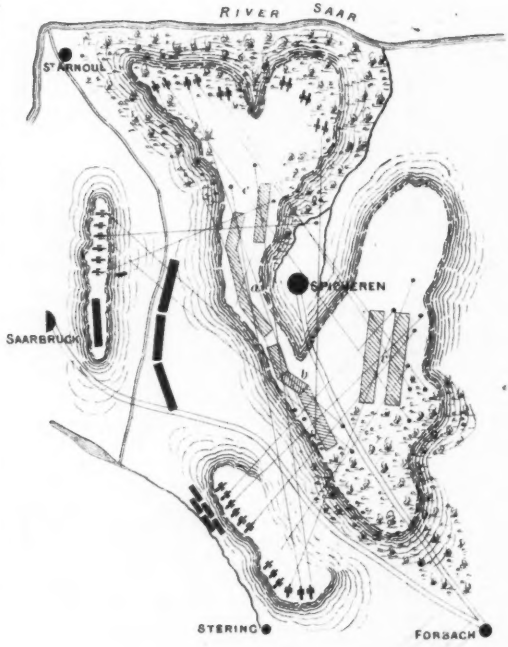
In watching the French field artillery at Chalons (where Marshal Bazaine commanded in the summer of 1869), I was struck with incongruities. Their tactical action was free and bold to a degree; the divisional guns advancing with and in advance of skirmishers, the large artillery reserves acting decisively with cavalry masses. But this action was only possible on the plains of Chalons; they were practising in peace what destroyed them in war. Their mobility was not real, for they had no means of carrying their gunners, except on the waggons and limbers; the former were thus brought under fire, and the explosion of ammunition waggons paralysing whole batteries, were the first results of the present war. For imperial reasons, the unfortunate Frank had sinned against his own military maxims. How long since Marmont wrote, "Le premier mérite de l'artillerie, après "la bravourie des canoniers, et la justesse du tir, *c'est la mobilité.*"

The Prussian gunners are carried on gun-axle seats and limbers, and they have saddles on the off horses for emergency, thus bringing a minimum of men and horses under fire, but sufficient for the working of the guns. I believe they copied this system from the Bengal artillery, who practised it for more than a quarter of a century before the amalgamation. There were Prussian Princes present in the Punjaub campaigns. Prussian artillery officers have been attached to the Abyssinian expedition, and courteously shewn every detail of our service and arsenals. It is deeply to be regretted that we have not insisted upon reciprocity in the present war. There is not one British Artillery Officer learning invaluable lessons from the siege of Paris, but our instruction has to filter through the "Times" correspondent, who puzzles himself and his readers with dissertations on the superior capacity of spherical to cylindro-conoidal projectiles.

The Prussian retrospective pamphlet before alluded to, produced a storm of indignant commentary from senior Officers, followed by a calm effort to take the advice given. The results of 1870 show glorious amends for the shortcoming attributed to the sister scientific services in 1866.

In the English Army there is no official text book, nor any authorized rules for artillery tactics. In the English language I know of no practical work on the subject, except, perhaps, the translation by Colonel Maxwell, R.A., of a treatise by the Prussian artilleryman Taubert, somewhat out of date; and the lucid chapter in Colonel Owen's artillery lectures. Colonel Soady, R.A., has also ably collected foreign opinions.

Is this a proof that the subject has not received due attention in the British Army? Our glorious annals since Marlborough may be searched in vain for that grand application of artillery common to the Imperial Sous-Lieutenant and his great gunners Senarmont and Drouet. The reasons for this and other insular peculiarities lie too far back in time, and too deep in our social and military system, to be discussed here The fault, if it exists, does not lie at the door of the British artillery, whose rolls bear such names as Congreve, Shrapnel, Dickson, Frazer, Ross, Bull and Norman Ramsay, Pollock and Henry Lawrence.


RIVER SAAR
St ARNOUL
SPICHEREN
SAARBRUCK
STERING
FORBACH

PLAN 2.

PL

R MEUSE

SARDAO
Milreado
COIMBRA

PLA

PLAN 3.

PLAN 1.

PLAN 4.

I think it is worthy of consideration that the great Duke never lost a gun! is it that he did not habitually use the arm anywhere near its limit of application? Words of mine are of no value on such a point; let me refer to the soldier historian Napier, and take Busaco as one instance.

My plan shews the allied Army drawn up on those memorable heights, the French on the opposite side of a deep wooded valley, "A "chasm so profound that the naked eye could hardly distinguish the "movement of troops at the bottom, yet in parts so narrow that "12-pounders could range to salient points on the opposite side." Four roads crossed at right angles to the English position, from right to left of which a road along the crest afforded an easy communication. Plan 1.

Fifty guns were placed along the salient spurs of the English line, firing down wooded declivities, apparently too steep for effective artillery fire, if we may judge by the graphic description of the light division skirmishers driven breathless and begrimed with powder upon the guns (C), "which had to be rapidly withdrawn," until Crawford's shrill command sent "1,800 British bayonets sparkling over the brow of the hill," with a horrid shout, overthrowing the French column.

These guns on the salient spur in front of the Convent were subsequently effective against the flank of an attack in three columns by Ney, which rested in a pine wood. Two other enormous French columns under Reynier, attacked by the road passing St. Antonio de Cantara, and actually effected a lodgment on the crest of the English position between the 3rd and 5th divisions (F). "The right of the "3rd division was forced back, and the 8th Portugese Regiment broken "to pieces; the leading French battalions 'wheeled to the right, in- "tending to sweep the summit of the Sierra,' but at that moment Lord "Wellington caused *two guns* to open with grape upon their flank, while "a heavy musketry was still poured into their front, and, in a little "time, the 45th and 88th Regiments charged so furiously that even "fresh men could not have withstood them. The French, quite spent "with their previous efforts, opened a straggling fire, and both parties, "mingling together, went down the mountain side with a mighty "clamour and confusion, the dead and dying strewing the way even "to the bottom of the valley."

To an artillery eye the key-stone of an arch of strength (like the position of Busaco) undoubtedly was, instead of dotting guns along the face of a declivity they could scarcely search, there should have been an artillery reserve, with the heavy cavalry on the plateau at (H), or concealed behind the convent, to wait until the French attack developed itself, in mighty columns along one, or other, or all of the three roads, leading to the right, centre, and left of the English position. Then the artillery reserve on the road along the crest which Napier says "afforded an easy communication from right to left," could have acted with crushing effect on the head of an attack by any of the three roads at right angles to that on which they moved, and in the event of such a crisis as the Freuch penetration between the

3rd and 5th division at (F), consider the effect of a dozen guns instead of the inevitable two turned on by Lord Wellington.

Let us follow the other possible uses of this reserve of guns. "On "the evening of the 28th, when Wellington, though he had gained a "victory, found the French had turned his left, looking at the distant "columns with great earnestness, he seemed uneasy, his countenance "wore a fierce, angry expression, and suddenly mounting his horse "he rode away without speaking. One hour afterwards the whole "army was in motion; in retreat, abandoning stores of harness, tents, "shoes, spirits, salt meat, &c., withdrawn so unskilfully that a troop "of French dragoons, which had passed the ford, now came close upon "the flank, and a single regiment of infantry would have destroyed "the division, wedged as it was in a hollow way, and unable to "retreat, to advance, or break out on either side." A reserve of mobile artillery acting with the cavalry, on ground favourable to both arms as it was about Milheada, would certainly have stopped the French deployment at Boyalva, if it did not annihilate them.

"The march by which Busaco was turned, was a violation of the "soundest principles of war. In a purely military view the English "General may be censured for not punishing his adversary's rashness, "who violated all three of Napoleon's greatest maxims, threw "his whole army into a narrow defile within ten miles of an enemy in "position, with much disorder. Massena's army was not then in a "condition to fight, and he had *abandoned his line of communication* "*without having established another.* Wellington was within four hours "march of either end of the defile through which the French army "was moving; he might with the 1st division and the cavalry, the "Portugese regular troops and Trants militia, have presented 12,000 "or 14,000 men at 'Sardao,' to head the French in the defile."

Such a force, with the Mobile field artillery of a reserve, should have done so, "while the 2nd, 3rd, 4th, 5th, and light divisions ad- "vancing by Martagoa assailed their rear. That he did not do this is "to be attributed to his political position * * * * nevertheless "his retreat was as dangerous as such an attack would have been." It is difficult to understand any political position forbidding the annihilation of an enemy. The description and military opinions are Napier's—the artillery application alone is mine.

For obvious reasons I have drawn a lesson from the annals of a glorious war, in which most of the illustrious actors have passed away. I am unwilling to touch upon the field artillery incidents of the Crimean campaign, in which I had not the honour of bearing a part. Kinglake gives us a crisis evolved also out of two guns, served by artillery Staff Officers on the Alma knoll. The gunners had been left behind for want of gun axle seats, and saddles on the off horses. Fifteen years have passed, and we are still without the means of carrying field artillery gunners, though it is believed that gun axle seats without foot-rests, and saddles without stirrups, have been sanctioned. The French are the only other field artillery who have not yet found a means of carrying their gunners. Our splendid horse artillery are the only really mobile portion of our service, but the expense of this branch and

the necessary lightness of their guns will always restrict their number.

My remarks have mostly pointed to things we ought not to have done, or have left undone. With the object of proving that the past can be no model for the future, I venture now to give a few broad artillery maxims, upon which my brother officers have been for some time tolerably unanimous, and which appear to be confirmed by the practice of the present war. Anyone who expects to find artillery tactics reduced to a few cut and dried rules for invariable application, must be disappointed, as the nature of the ground, and other concomitant circumstances must be an ever-varying element in such problems. A practical knowledge of tactics is not likely to be acquired by any branch of the service, until the Legislature passes an Act permitting the movement of troops across country for a few weeks after harvest. The existence of this law in Prussia has enabled her Army, after half a century of peace, to step into the arena of Europe as a conqueror.

The questions in Prussian military examinations are few, and ample time is given, the answer being a short essay, to test the thinking power of the pupil, rather than an exercise of memory, as with us. We cram with details, instead of teaching the habit of thought.

Field artillery tactics may be broadly considered under two heads—1st, Divisional, or simply supporting the infantry, paving the way for its advance or covering its retreat.

2nd, Reserve. Acting and striking *en masse*, in obedience to the will of a master mind.

Divisional Artillery.

Great freedom of action must be given to the Battery Commander, who should ever have before him the golden rule of Taubert, *i.e.*, "Divisional artillery, like divisional cavalry, is merely an auxiliary "arm; and that the infantry, and not the artillery, is the chief "element in an action. It is therefore the duty of that artillery to "comprehend the object momentarily in view, with quickness and "accuracy, and powerfully to support the infantry in combat." The "Prussian Infantry" pamphlet says that, without artillery, infantry cannot act against infantry on the defensive, and even artillery, firing direct at infantry in shelter trenches, cannot shake them, as at Spicheren (Plan 2), where the Prussian artillery failed to move the French on the crest of the hill, until batteries took up positions in prolongation of their flank, and rendered possible the final successful advance of the infantry. In this case, the inefficiency of direct artillery fire, as compared with flank fire, was enhanced by the fact that the Prussians use only a percussion fuse and a common shell; firing at a position on the crest, all shells aimed high, flew harmless; those aimed low, stuck into the ground, and produced but little forward effect.

The division artillery is under the command of a Lieutenant-Colonel. A pamphlet by Sir Augustus Fraser, at the close of the Peninsular War, says, "With respect to the Field Officers of artillery "with an army, they are, by the present distribution of the arm,

"placed in a very singular situation. They are appointed to, and "understood to have the command of two batteries of field artillery. "But these batteries, being attached to a division of the Army, are "habitually separated from each other. In consequence, the Field "Officer cannot be with both; his presence with either is displeasing "to the Officer commanding the battery, who naturally wishes to "receive the credit of acting independently; and the Field Officer is "reduced to the alternative of either doing nothing, or of interfering "with the command of a Captain, probably very competent to the "charge of his own battery."

The Lieutenant-Colonel of artillery should be inseparable from his Divisional General, with whom he ought to be *en rapport*, and transmit his orders to the Battery Commanders by his two galloppers, the Adjutant and Acting Quartermaster, keeping a trumpeter with him. The new Army Signal Code ought to be habitually practised for directing the concentration of artillery fire, especially by means of Lancer escorts, whose gay pennons, in instructed hands, form the readiest method of conveying orders and information.

The stereotyped idea that artillery must conform to its infantry, dressing by them, &c., must be for ever dismissed, except for parade purposes. It was perhaps admissible when the Enfield rifle and smooth bore field gun were associated.

Now the limit of infantry fire is the commencement of artillery efficiency, whose guns should not be pushed closer, except when the gain to the infantry will be commensurate with the certain loss to the artillery.

At Gravelotte a field battery was pushed up to the French shelter-trenches (600 yards); four guns were destroyed while advancing; the remaining two produced no effect, and were nearly lost. A battery of horse artillery, taking advantage of gravel-pits to conceal their advance, and cover their horses while in action, maintained its position with great gallantry at 700 yards, but produced no effect, and two of the guns had to be thrown into the gravel-pits to prevent capture.

The strict alignment of guns with infantry compels them to fire straight to the front, which is not usually the direction of the enemy's greatest depth, flanking or oblique fire being most effective. When so aligned, throwing the trails of the guns outwards gives this effect; for when the flank is thrown forward it is exposed, and the pieces should be echelloned, the intervals being also increased.

Instead, however, of tying artillery to its infantry, the former should be given an escort of the veritable dragoons, *i.e.*, mounted soldiers with rifles, "who fight indifferently on foot or horseback," according to Dr. Johnson. He had as little idea of using the word indifferently in its modern sense as I have.

It is most important that a feeling of strong "cameraderie" should exist between the battery and its escort, which always springs up when they are habitually furnished from the same regiments.

In default of mounted infantry, the Prussians prefer Jäger escorts, and our own rifle brigade are incomparable on this service to any troops in the world.

Fig 1.

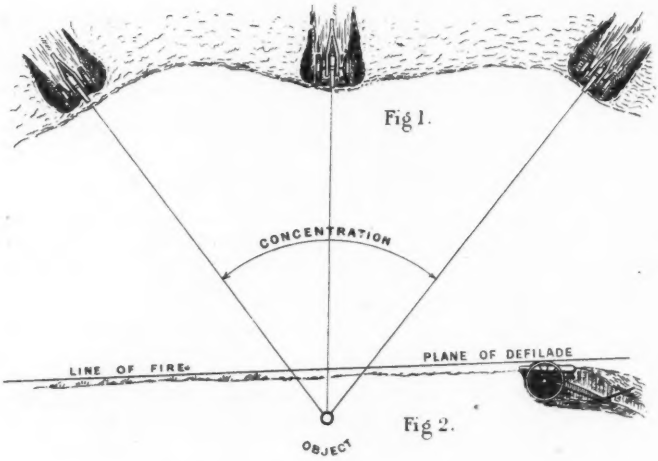
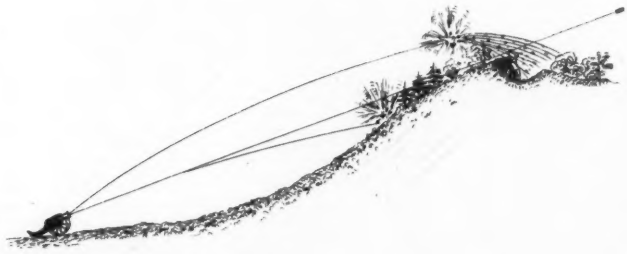


Fig 2.

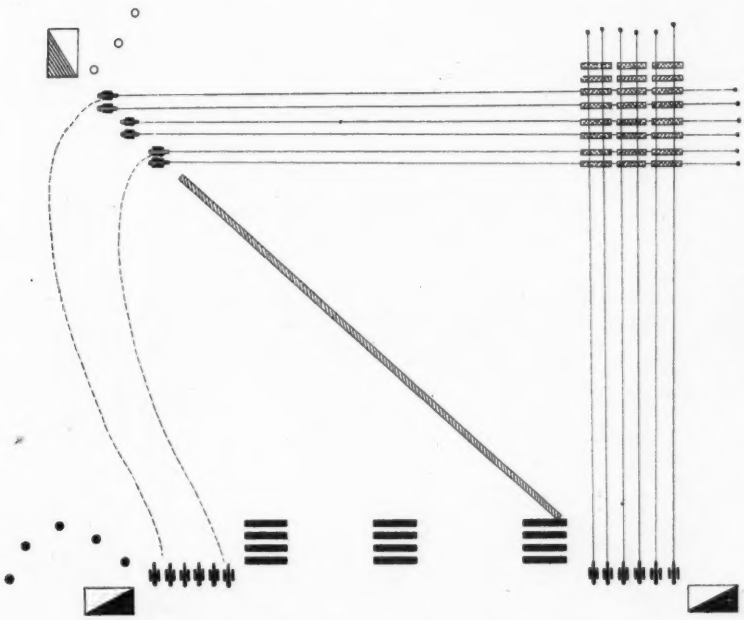


ACTION OF PERCUSSION AND TIME FUZES UPHILL.

Fig 5.

INKERMAN.

Fig 3.



DEPLOYMENT AND
CHANGE OF FRONT

Fig 4.

In advancing into action the 1st Captain rides several hundred yards in front, to select a position. The battery is brought up by the 2nd Captain, in obedience to the sword arm signals of its Commander, who may also take his trumpeter. A dozen mounted dragoon "*eclaireurs*" to accompany the Captain would render this service more effective, and perhaps save the battery from the loss of its leader. Sixty gunners, armed, mounted, and trained as escort "*eclaireurs*," would render the battery self-supporting, and free to strike for its infantry from the most advantageous position.

Such a reserve of mounted dragoon gunners would also be available to fill up casualties, or get a gun anywhere with lasso-harness.

The points for consideration of a position are in order of importance:—

(*a*) Efficiency of fire.
(*b*) Cover for the pieces and limbers, if possible.
(*c*) Position of the other troops.
(*d*) Facility of retirement.
(*e*) Facility of advance.

"These conditions are seldom united in an equal degree. The Cap-
" tain must at once decide which is the most important to secure the
" object of the engagement, and which to give up, as least essential."
No position can be called a good one that does not fulfil the first condition.

Guns should not be placed immediately in front of other troops; a double target is thus offered. Prussian cavalry rode through two batteries at Rezonville; the French infantry in rear fired at friend and foe. This happened to two batteries in succession with infantry in rear. Gunners armed with revolvers could take shelter under the gun-carriages, till the cavalry storm swept past, the limbers retiring in front of it; while the loiterers behind a charge are not the sort of men to prod a revolver-armed resolute gunner out of his retreat.

When the *morale* of the enemy is not good, batteries may effectively be pushed forward with skirmishers and a few light troops, producing great results with but little expenditure of the other arms. This was our practice at the close of the Indian Mutiny, and the Prussians acting against French moblots and Garibaldians near Dijon followed the same tactics.

About Le Mans the country is much enclosed, like England; the Prussian artillery never attempted to manœuvre, but the officer carefully rode out and selected a position, and generally remained in it, often silent, rather than waste ammunition by firing without a clear view. Our Officers require a field glass, like the Staff, instead of the generally empty pouch belt. Except for defensive positions, our close country is most unfavourable to the development of free artillery action. The artillery eye-witnesses of the present war are all impressed with the idea that the absence of a range-finder is the great artillery defect on both sides. Trial shots are uncertain, and unmask your batteries; the large bursting charge of the Prussian common shell is an assistance in indicating the range.

The French, it is said, in addition to divisional reserve artillery, are

endeavouring to re-introduce battalion guns, which proves their utter want of self-reliant infantry. The pieces are light and long ranging, on the Whitworth principle, a small hexagonal bore and very elongated shell.

Guns should not be placed immediately in rear, as again giving a double target, except in such positions as Sedan, where an amphitheatre of hills allowed their converging fire to act over the heads of the columns, and gave increased certainty to the action of their percussion fuzes. Plan 3.

The reverse of a gentle slope, Fig. 2, not exceeding 4°, with gun muzzles only appearing over the ridge, is generally favourable, but twenty minutes' work with the entrenching tools on the limber will give excellent gun pits, in which the principal advantage of the breech-loader gun is apparent.

When the opposing guns are on higher ground, Fig. 3, the reverse of a slope is sometimes most disastrous, the ground acting as a natural glacis, coinciding with the descending trajectory of the enemy's fire, as at Inkerman. An advance over the ridge is the remedy for this evil, which will at once make itself felt.

It is needless to remark that during all infantry deployments their fire is lost, and changes of front should be covered by the divisional artillery sweeping the face of the new alignment. Fig. 4.

I am of opinion that the Russian and Austrian unit of eight guns per battery is best suited for tactics. In peace it can be reduced to six or four, and is easily expanded, no more officers being required, the 1st Captain being a Major, and the 2nd Captain taking charge of a division or half battery when necessary. A flying column can seldom take more than a battery, and will want to work with a half battery on either flank. Four guns are almost as effective as six, while three on each flank break up one subaltern command, and if it is required to reinforce a flank there is a difficulty, for it is not allowable to leave one gun on a flank, or send it away alone. Each division of two guns is complete in stores for repairs, artificers, &c., and can be detached on any service under its Subaltern Commander.

Tactical use of Artillery under the second head, viz., Reserves "à la Grand Tactique."

"The general engagement once begun, he who has the address to "bring suddenly and unknown to the enemy an unexpected amount of "artillery to bear upon the most important points, is sure to carry "them."

This was the dictum of *the* Artillery-General Napoleon the Great.

At the oft-quoted battle of Friedland, "36 pieces were collected "from different divisions by Senarmont, who commanded the French "artillery; this concentration of the divisional artillery was contrary "to the wishes of the Generals, but was done with Victor's consent, "silencing the Russian batteries on the right bank, and driving the "infantry into the defile before Friedland. The Russian cavalry "attempted to check the advance of the battery, but Senarmont

"promptly changed front, and repulsed it with ease. Napoleon him-
"self was astonished at the effect produced by this battery acting
"thus independently. The defeat of the Russians was complete, and
"their loss severe." The final concentration was due to the confined space, and the short range of smooth-bore guns; to copy this action would be an error with rifled artillery.

Taking the artillery from a division to form a reserve is, however, inadvisable; it destroys the divisional tactical unit, and tends to dispirit any but the most self-reliant infantry.

The artillery reserve is as essential to an army corps as the cavalry division, and is as much a tactical unit to be placed under a selected Artillery-General.

It is probable that the increase of artillery range will lead to a different method of reserve application, viz., *concentration of fire*, but *dispersion* of batteries.

With smooth-bore guns it was necessary to agglomerate batteries, so as to produce an effect on an objective point. The same result may be produced by concentrating fire from batteries sent to different points for the purpose, or by directing the concentration of the divisional artillery fire by army code signals.

Both French and Prussians find it necessary to increase the intervals between the guns of a battery from 20 to 40 yards, when exposed to the enemy's shell fire, the bursts of which are found to be so laterally destructive. When it is wished to increase the artillery power at a certain point, a fresh battery is sent up to take part between the intervals, and damaged batteries are relieved by fresh ones from the reserve in a similar manner.

These methods hold out many advantages over concentration of guns in an unwieldy mass, which cannot well be forced into action without dislocating the line of battle. Eighty British guns or thereabouts were once drawn up in rear of, and it was said in support of, allies, without firing a shot; two batteries only were employed on the flanks of the general engagement. In the event of disaster, guns so placed can give no support; friend and foe are mingled in a mass, against which no man could fire, unless indeed the position was sufficiently high, and the combatants far enough apart, to allow of discriminate artillery action. This would hardly be the case in retreat; and an unwieldy mass of guns and ammunition waggons driving helplessly to the rear would block up all roads, amid a storm of anathemas from friends, if not projectiles from foes.

At Gravelotte, however, eighty-four guns, with hussar supports, galloped up a ravine which concealed their approach. Plan 4. The three first batteries, under an Artillery General, on deploying, found six mitrailleurs in action; the whole eighty-four guns were concentrated on the nearest mitrailleur; there remained nothing of it but wreck. The same with three others in succession; the two last did not wait for this annihilation. The eighty-four guns were crowded, to avoid drawing fire on a field hospital in rear of the intended alignment. Nevertheless, by concentration of fire, the French guns, about equal in number, were silenced in succession, the difference between French and German artillery fire

being that the former believe in "*feu d'enfer.*" When they think the enemy is in front, they blaze away quickly. The Prussians generally avoid the fire-swept-zone; when French men and ammunition are exhausted, they attack. Excessive deliberation and careful pointing are the peculiarity of Prussian artillery fire, and nothing will induce an officer to waste ammunition unless he sees his object.

More than ever, artillery action requires an artillery head, but no English Artillery General has ever been permitted to command a British army, or even a division, in Europe.

It is sad to read what a distinguished veteran before referred to, wrote, in 1818, at the close of his campaigns. More than half a century has passed away, and yet is there any improvement in the status of the Artillery General, whose most important functions on service will be usurped by the omniverous Control Department?* Any service, the representative chiefs of which, are systematically overlooked, must deteriorate.

Sir Augustus Fraser says: "Let us consider what is the present "situation of the Officer commanding the artillery of any Army. He "is expected to be responsible for all that is understood by the effi- "ciency of the arm when it joins the Army, it is subdivided and placed "in various ways under the command and superintendence of the "general Officers of the cavalry and infantry; so that, with the "exception of attending to its wants in men, horses, ordnance, and "stores, and of *endeavouring* by correspondence with the Department "in England to obtain the necessary supplies, the Commanding Officer "of artillery may be almost said to have little to do with the arm "in the field. His opinion, we have seen, is not asked as to the selec- "tion of the arm for service, and it is as clearly never required "for the distribution of it afterwards. He can seldom be known to "his Commander but by the wants of the arm, or by the sins of the "system. Can it be wondered then that, rarely coming in contact but "on these ungracious occasions, he seldoms obtains the consideration "which he does not appear to deserve? As to signalizing himself by "any application of the arm in the field, it is out of the question. He "remains an individual without the power of moving a single gun."

Horse Artillery.

Never having had the honour of serving in this distinguished branch, I have not touched upon its especial tactics. Future wars will, I believe, give it a wider field of employment, both as a reserve to strike quickly and decisively; and also to give to our Uhlans the power of holding what they touch, a proportion of horse artillery Gatling-guns with cavalry would, I believe, be a happy marriage of fire and steel in the feelers of an Army. At the most favourable range against targets, 4 cwt. of ammunition from Gatlings produces three times the result of 12 cwt. from field guns, or nine times the effect; but field guns could destroy the Gatlings at long range.

* Which Sir William Mansfield calls a system for *uneducating Generals.*

Siege and Garrison Artillery.

Siege and garrison artillery tactics include the attack and defence of fortresses, as well as the tactical use of the latter, with an Army acting under their protection, or pivoting upon them, and runs into strategical considerations of bases, depôts, and lines of communication; too large a subject for this paper. It will suffice to say that the feeble defence of the mass of French fortresses is attributable to their ancient construction and armament; a system of fortification 200 years old, is miscalled modern, and a mass of houses crowded into a weak enceinte have crumbled rapidly into ruin, under the concentrated fire of Prussian guns, defended, as these fortresses appear to have been, by everybody but garrison artillerymen. The comparatively protracted defence of Paris by detached forts appears to point to the advantages of a salient system of Moncrieff-pits, as also the disadvantages of embrasures acting as shot-funnels to an enemy's projectiles.

The Prussians have largely employed the barbette system. It would be seen if they approached closer for breeching purposes, whether the French fire would be sufficiently accurate to dismount guns so placed. Against skilful and unopposed fire, as at Shoeburyness, such guns would be put *hors de combat* in a few minutes. Increased range of modern artillery gives a wide field for the selection of sites for enfilade batteries. A considerable distance beyond the salients of Mont Avron were woods; behind these, Prussian batteries were made, and armed unseen. The trees in the line of fire were partially sawn through, and fell with the first discharge, leaving unimpeded the path of their terrible projectiles. Thionville was reduced in the same manner; only one battery was in the open, and that a screen battery, such as we make at Shoeburyness. Only one round each quarter of an hour was allowed from any gun. This was to ensure accurate laying, and possibly also for fear of damage to breach-loading apparatus.

It may be interesting to know that this application of a natural screen having been foreseen before the present war by us of the Royal Artillery, an experiment of the same sort was carried out at a sham fight, the locality of which shall be nameless, or the experimentalist would certainly have a heavy bill of damages laid to his charge, though the real value of the destroyed Government timber was only a few shillings, the amount demanded would doubtless cool his military ardour.

The resistance of the Paris revetments and casemates remains to be compared to the system in some Prussian forts, which have no escarps but slopes of earth, and rely upon flank fire and counterscarps against a *coup de main*. The effect of concussion in continuous fire of very heavy guns in casemates, may have the effect upon artillerymen which a naval Officer informs me continuous heavy fire has upon British tars, of all men the least nervous; it is said to be a shock from which men and Officers suffer for days. It is reported that the crews of guns in Paris casemates had to be relieved frequently, and often fainted at the gun.

The Prussians are getting to feel the disadvantage of using only one

projectile, common shell and percussion fuze; firing up hill or into soft ground they fail (Fig. 5). They are introducing Shrapnel and a time fuze. Trusting to one nature of fire appears rather like a quack doctor who has but one pill for all cases. I cannot but believe they have copied much that may be seen at Shoeburyness, but are still some way behind us in technical artillery matters. In artillery tactics they are in advance, possibly because artillery tactics have never been in the hands of artillery Officers.

As regards our field and garrison artillery, *matériel* guns, and ammunition, &c., I believe it has always been the best in the world, and as long as England maintains her manufacturing supremacy, will, I trust, remain so, in spite of adverse criticism from home and foreign sources.

Technical Artillery Instruction—Field, Siege, and Garrison.

Improvements in artillery *matériel* are thought by many to be worse than useless, unless accompanied by a corresponding increase of intelligence and training. I believed I was giving voice to the wish of a large proportion of my brother Officers, when I proposed a plan for encouraging this professional knowledge among the rank and file, or applying it, where it exists, by selecting the best qualified Non-commissioned Officers or men, for pointing our guns in action. Our expensive modern projectiles will be worse than wasted in war, as they are in peace, fired away by men who may be short-sighted, unable to adjust a tangent scale, or incapable of setting a fuze to a given range.

Some years passed in daily instruction of the rank and file of the Royal Artillery, have impressed me very painfully with the vast importance of this subject, about which I cannot think myself mistaken.

There is an absolute necessity for adopting some system of selection in our artillery, unless we are content to be swept from future fields of battle with bloodshed and dishonour, as an imposture, an incumbrance to a self-reliant British infantry, armed with terrible breech-loaders, who will only ask us to batter buildings or expect us to fire at nothing smaller than a town. Unpalatable as such expressions may be, there is nothing gained by dishonestly shirking conclusions that may be drawn from the results of the late and present campaigns, and from the deliberate trials of the Dartmoor Committee. Their report shews marvellously few hits when the circumstances approached nearest to the probabilities of actual war, viz., unknown range, uneven ground, and rapid fire; add to these the element of nervousness and confusion, and you would have still less than the results reported upon by the Committee "as so unsatisfactory, and the expenditure of ammunition so much out of all proportion to the effect produced." The success of Captain Nolan's range-finder, together with a system of picked marksmen trained to its use, would I believe, when combined with mobility given by gun-axle seats, again restore to field artillery its destructive superiority over the other arms.

The French artillery choose the best shots with carbines as likely to

be the best natural gunners, and a further selection is then made by the inexpensive plan of trials, by pointing guns at objects against time, but without ammunition, and lastly by actual firing at a target. These selected men are termed "pointeurs," and every gun in peace or war is laid by one of them, there being sufficient in each battery to make up casualties. It will be time enough to object to copy the French field artillery in anything, when it can be proved that they have failed in everything. When the mists of passion shall have blown off the present contest between France and Prussia, it will, I believe, be found that the regular French artillery have not utterly failed, but lost heavily in boldly supporting and saving their infantry. Their free tactics (combined with certain defects in *matériel*, I shall not dwell upon here) have caused loss in guns and men It is doubly painful that some would prefer retrograding to a less efficient weapon, rather than educate our gunners up to our arms of precision. Because our national qualities make us good gunners, our men are phlegmatic to a fault. The Teuton and Scandinavian blood gives that cool precision in action which the excitable Gaul has failed to shew. The French artillery Officers knew their national defect, and tried to remedy it by selecting gunners as much as possible from Alsace. Gunnery education is only possible to us by a system of selection and prizes, not necessary to the Prussians, because all their men are educated. The French rank and file are more like our own, mixed and very varied in education.

Restricting the annual practice to a certain percentage of the most intelligent and keen-sighted Non-commissioned Officers and gunners of each battery, would reduce the expense below that of the present wasteful system.

As regards the garrison brigades, a little modification in the amount allowed for annual practice would, without extra expense, meet the requirements of competition, a considerable portion of which might be carried on with the old smooth-bore ammunition, all but obsolete, encumbering as it does our Controllers, with the charge of pyramids rivalling that of Cheops. A preliminary instruction and examination by subaltern Officers before sending in the names of those selected for practice in their divisions would benefit both Officer and man, refreshing the half forgotten knowledge of the former, increasing his interest in his profession and his men, giving him a measure of their intellectual calibre, and enabling him to recommend for promotion with justice and confidence; while there would be a reaction of kindly feeling and respect from the men to their Battery Officers, who in garrison brigades, as matters now stand, have little to do with them except in the routine of orderly duty. The majority of Subalterns in the Royal Artillery have reached an age when men in other branches generally command companies, and sometimes regiments. They might be entrusted with the instruction and selection of their marksmen.

Gunners' nature is only human nature: the Royal Artillery have no rewards for efficiency, while infantry, cavalry, seamen, and marines and Volunteer Artillery, receive extra pay or prizes for proficiency with their special weapon, be it sword, lance, rifle, carbine, or great gun.

Lord Straithnairn, when Commander-in-Chief in India, introduced a system of competitive practice for the artillery, with extra pay and prize-badges as for infantry: it is very variously spoken of by artillery Officers. All are agreed that being carried on entirely with smooth-bore guns, the results were much modified by chance; the admission of drivers and shoeing-smiths (who would rarely, if ever, have to lay a gun on service), &c., into competition with gunners and Nos. 1 was thought a mistake: every man to his calling.

Prize-pay and a badge of cross-whips might be given to a certain percentage of the best drivers, whose horses were in good condition. Those Officers who adhered to the spirit of Lord Straithnairn's instructions allowed no man to compete, unless he understood the elementary principles of gunnery, the setting of fuzes, was perfect at drill, and a first-class judge of distance. In fact, they who tried the system fairly, speak in the highest terms of the spirit of emulation and efficiency it produced, especially the preliminary instruction in barrack rooms by the Subaltern Officers.

Having been asked by many of my brother Officers and some members of the Committee, to draw up for the Institution-Papers the outline of a scheme for competitive practice, I ventured to do so with the hope that general attention would be drawn to the subject, and errors I have made, be remedied by the suggestions of any of my brother Officers.

I have made the amount of ammunition approximate as much as possible to that already allowed, and have assimilated the system of scoring to that laid down by the National Artillery Association, at Shoeburyness, which works without trouble in the Volunteer Artillery competitive practice.

I wish to draw attention to what I take to be a blot in our system of artillery, viz., that though the instructors very justly receive extra pay for extra work, the pupils have no reward or inducement. In the ranks are mingled those who cannot read the figures on a fuze or tangent scale; and others of excellent education, great natural powers, and quickness of sight. It must be most reprehensible to have no system of selection for marksmen and range-finders, and to apply the same dull routine of training to all.

We all know that Non-commissioned Officers are selected for many excellent qualities with which gunnery proficiency has nothing to do. There is an utter disbelief in all gunnery, and necessity for straight shooting among a few artillery Officers, whose professional education ceased before the introduction of modern weapons. The sooner this opinion is honestly expressed and argued out in black and white, the better for the English people: for the question, though it takes its rise from a small portion of the service, has national issues. I am glad to say that a Committee has been appointed to decide upon the details of a system of selection and prizes.

The garrison artilleryman is undoubtedly the soldier of most varied accomplishments; from him is required the steadiness of a guardsman, the keenness of the rifleman, combined with the rough and ready energy of a sailor in handling heavy weights, ropes, tackles, and

mechanical appliances, together with a knowledge of the varied armaments and stores of the artillery service. Laying, loading, adjusting the fuze, pointing and firing his gun, are the least arduous and important of his duties. The monster modern guns of 12, 18, 25, and even 35 tons have first to be mounted inside and on the top of casemates, by means of gyns, shears (see models), hydraulic lifts, inclined planes, &c. In war, disabled guns and carriages would have to be removed and replaced, without the aid of gyns or sheers, too conspicuous for use within range of rifled guns. A whole front may have to be disarmed with all possible despatch, and the guns, carriages, and platforms transferred to another face, exposed to the real pressure of attack apprehended from another quarter.

Our Artillery Officers, sent in more liberal times to acquire information on the Continent, tell us that they saw this operation performed in an incredibly short time, at the annual inspection of an Artillery General in Russia, where the fortresses are invariably under the command of an Artillery or Engineer Officer. Repairing damaged embrasures and platforms, raising and thickening parapets, putting an extra layer of earth on bomb proofs and magazines, essentially artillery duties supposed to be performed by engineers, would in the exigencies of war have to be carried out by artillery, assisted with infantry. It is to be regretted that classes of artillery are not sent down to Chatham, to profit by the siege operations carried on there. The instruction at the School of Gunnery, Shoeburyness, is most excellent, but there is no fortress to besiege, and it seems a pity to carry on instructional siege operations without gunners.

Military bridging and rafting for the transport of heavy ordnance, as well as embarking guns, form part of the admirably practical Shoeburyness course; for it is most important in war that artillery should be self-reliant, and not obstruct the bridges made for the rest of the Army by the engineer train, who are not, however, always at hand in minor operations, where the artillery must fall back upon their own resoures.

In all wine-growing and beer-drinking countries, casks are always procurable, and, together with the salt pork, flour, and empty rum casks of the commissariat, are at hand. These, with a lashed superstructure of rafters and floors from adjacent houses, form rafts capable of transporting the heaviest artillery with its ammunition, carriages, harness, &c. Horses are swum across, or can ford where the water would cover the ammunition boxes.

The Prussian retrospect comments on the inactivity of the artillery of an army corps on the wrong side of the river Bristritz, in the absence of the pontoon train. It is unfortunate that this sort of service is scarcely recognised by us or calculated upon, and has only been occasionally performed on emergency by some unusually self-reliant officer.

Our silver streak renders the disembarkation of artillery a perpetually recurring event. Ably as we have been assisted by our brother blue jackets of the Navy, our artillery in future wars will be more than ever self-helpful, thanks to Shoeburyness.

Being fond of false economy, we have never commenced a siege with an adequate siege train, but as the sea must be our base of operations, we have always fallen back upon the Navy for guns; these and their carriages not being suitable for going across country, have to be taken to the front by various expedients, which require that the Royal Artilleryman and his friend Jack should be, and have proved themselves, the most indefatigable and shifty of mortals. But Jack and his guns cannot be in two places at once. Is it not probable that the withdrawal of sailors and guns from the French fleet is the reason why, like our own in the Crimea, though rendering glorious service on shore, it can scarcely be said to have achieved much on its own element?

When it is considered that artillery improvements must be rapidly progressive, and that it would be impolitic, if not impossible to recall from distant stations and reject for service, guns and stores of a comparatively old, but scarcely less efficient pattern, it is the firm conviction of Artillery Officers best acquainted with the service, that the Royal Artillery can never be efficient until the care of their own special weapons and stores is taken from the control, separated from "munition de bouche," and handed over to the artillery. You select artillery officers by open competition, they are scientifically and practically instructed in the manufacture of guns, powder, and all the complicated material of their service, and yet you take from them the most important part of their duties, to be handed over to civilians! In addition to the ordinary courses of artillery instruction, there was an annual class for Officers coming from out stations, as inspectors of war stores, but the new control Officers were naturally found so ignorant of a service for which they were not educated, that the laboratory department could not stand the strain of instructing them; and the Artillery Officers who wished to acquire a knowledge of the latest improvements in their own arm, were put off every alternate year to make room for the instruction of Commissariat Officers and others in duties that are essentially artillery. This is not likely to be borne without deterioration of *esprit* and efficiency by any body of Officers. As for the Non-commissioned Officers and rank and file, with whom the eye educates the mind, efficiency cannot be expected, as long as they are relegated to infantry drill, varied by the occasional handling of the obsolete smooth-bores which still encumber our forts. The artillery duties of transporting and embarking the newest guns and ammunition in our arsenals are given to the Army Service Corps, who it is said are to be increased to meet these requirements. This duty was formerly entrusted to the garrison artillery, who, with the artillery drivers, also employed in Woolwich arsenal, formed an artillery reserve, available in war, which we drew upon for the Crimea, their places being supplied by civilians with contract teams.

Reserve Artillery, Militia, and Volunteers.

The necessity for instructing 50,000 Militia and Volunteer Artillery, eager to learn, but who have no professional artillery chief, opens a

wide field for the energy of the regular artillery. Such a vast organization to be brought into being will, I hope, lead to the appointment of some Artillery Officer of rank and known professional ability, to the position of Director-General of Artillery Instruction, which at present, with its numerous departments, the Royal Military Academy, School of Gunnery, Advanced class, Laboratory, Gun Factory and Carriage Departmental instructors, requires a head.

I have not space to touch upon the scientific instruction of Artillery Officers. It is sufficiently well known and acknowledged in this country, where we can register the velocity of a shot before it leaves the gun. A report upon the education of artillery officers, is already in the hands of the War Minister. Judging by the distinguished names of the committee, and the fact that the evidence of no less than 54 artillery officers has been taken, I have no doubt but that their recommendations will be duly considered and acted upon. The committee at all events have the full confidence and respect of their brother Officers of all ranks.

My readers may not have realized the expectations raised by the title of this lecture, which has been turned somewhat from its intended course, for two reasons. It would ill become me to anticipate or guess at the details of the report before alluded to upon the education of Artillery Officers, upon which I was called to give evidence, still less to anticipate that of the Committee on the Classification of Gunners and Drivers, of which I have lately had the honour of being appointed Secretary.

In conclusion, it must be borne in mind that the real brunt of all fighting is borne by the infantry; and it must not be supposed that I forget this fact, because I am treating only of artillery. No man appreciates more highly than I do the resolute British infantry "*Nulli secundus.*"

There is in our Army a class found in no other; Officers who at their own peril and private expense hang about contending armies to gain military experience; discouraged by the State, thwarted, and sometimes arrested by both sides. They obtain for us that knowledge which our Government freely offers to all our possible enemies.

Much valuable information has been given me by Col. Smythe, R.A., and the artillery brothers, Brackenbury, who have, "*en amateur*," encountered the fatigues and dangers of many campaigns. I am indebted to Lieut. Cunninghan, of the Artillery, for the highly artistic drawing of a position covering a strategical point, viz., the bridge. Lieut. Gardner, of the Royal Navy, like a true brother blue jacket, has assisted me with plans.

Evening Meeting.

Monday, February 6th, 1871.

REAR-ADMIRAL A. P. RYDER, in the Chair.

NAMES of MEMBERS who joined the Institution between the 31st January and the 6th February.

ANNUAL.

Cochrane, H. S., V.C., Major, 7th Fus.
Daniell, E. S., Lt.-Col. 102nd Regt.
Rutley, J. Lewis, Capt. 2d Midx. Art. Volunteers.

FOG-SIGNALS IN FLEETS.

By Commander H. W. BRENT, R.N.

SUDDEN changes of temperature, or rather the fact of the existence in one district of a high temperature, while close by, the weather is cold, is the cause of fog, which, occurring at sea, and enveloping a ship, reduces that ship to the state of a man, walking in the noonday along the high road, suddenly struck blind, leaving the other senses in full force, and it may be quickened by the calamity. A dense fog at sea is not an alarming thing, but shutting out all that can be seen, you so suddenly become dependent on different means of finding your way, that it naturally causes anxiety to those in charge of ships, and every means that can be found, should be made use of to lighten that anxiety. At sea in a fog, being primarily dependent on the sense of hearing, noise of some sort to attract attention naturally takes the most prominent place to assist a ship in her movements; a blind man feels his way literally as he goes along, but a ship cannot actually do that, although in sea phrase the term "groping her way" is applied to a ship in a fog; this is figuratively doing the same as the blind man on shore, and consists in listening attentively, going slowly while uncertain, sounding often when near the land, and noticing also most attentively the speed and the time occupied in going certain numbers of miles.

I purpose this evening to speak on "fog-signalling" as regards Her Majesty's Navy only, more especially that part of it which relates to a fleet; for a fog enveloping a fleet that has a certain object in view, is of more consequence than to a single ship. The Orders in Council for preventing "collisions at sea" lay down what a single ship is to do to warn others of her approach, and how she may tell generally what is approaching. A fleet has not only these Orders, but that part of the

night signal-book which refers to fogs for guidance; these fog-signals come therefore within the scope of this paper.

Although everyone who has been at sea, has been frequently in a fog, yet they do not occur sufficiently often for Officers and men to be familiar enough with fog-signals; a fleet itself may also be so seldom in a fog that the fog-signals are but little studied; the day, and now night, signalling requiring so much attention, fog-signals are left until they are wanted, when it is expected that everything will be found clear and simple, and that the most ordinary individual will have not the slightest difficulty in either making or understanding the signals, or following the instructions laid down.

Fog-signalling should of all others be most distinct, regular, and simple, depending as it must entirely on sound; it should not be too quick, nor too slow, but made in a uniform steady way, always at the same rate, and in the same style; its instructions should be clear and distinct; the most simple means of communication that can be found should be used, at the same time taking care that the best instruments are supplied for making the signals, that even the ignorant may find the work so ready to their hands, and so easy of understanding, that the most stupid of them cannot fail to know, not only how to make the signals, but also understand the signals made in return.

In the fog-signals as at present laid down, signals by guns only, are in use, but since the introduction of the flashing night-signals by Captain Colomb, the same principle, with long and short sounds on the steam-whistle and fog-horn, has been much used. The loudest and most distinct noise being wanted, the firing of guns at regular and good intervals is of course the best method, as a gun, if the charge is sufficiently heavy, can be heard farther than any other noise at present made afloat, but there being a limit to gun signals, the flashing-signals by the steam-whistle, fog-horn, or bugle are a necessary, and I think a sufficient adjunct. I believe the present fog-signals, with the assistance of the flashing-signals, both somewhat altered, to be quite sufficient for all the wants of our fleets, my reason for saying so is from the experiments I have made, and the information I have received, both of which I intend to lay before you this evening.

Gun-fog-signals coming first, and knowing there were some difficulties connected with the present system, through the intervals at which the guns were fired, namely the preparative guns at intervals of 5 seconds, and the signal guns at intervals of 30 seconds, when at Portland, in June, 1869, by permission of Sir Thomas Symonds, then in command of the Channel Fleet, I sent two boom-boats lashed together, each carrying a 12-pounder Armstrong gun, outside the Breakwater, and went with a party of signalmen to the opposite side of the hill, to listen to the guns; the signalmen of the "Minotaur" on board their own ship, by order of Captain Goodenough, also listening and taking notes.

The experiments were to try the best intervals for distinguishing easily the guns fired, whether the present system of 5 seconds was not too quick and the 30 seconds too long; if so, what intermediate time would be better. Twenty-five series were tried, and both parties agreed in opinion regarding the intervals. The series were as follows:—

EXPERIMENTS at Portland, 20th July, 1869.

	Guns.	Interval.	Guns.	Remarks.
1	2 guns at 5 seconds.....	Interval of 30 seconds....	1 gun.....	Not understood.
2	2 guns at 5 seconds.....	Ditto	3 guns at 30 seconds ..	1 gun missed.
3	3 guns at 5 seconds.....	Ditto	2 guns at 30 seconds ..	Interval missed.
4	3 guns at 5 seconds.....	Ditto	3 guns at 30 seconds ..	Sounded irregular.
5	2 guns at 15 seconds	Ditto	2 guns at 5 seconds....	Sounded irregular.
6	3 guns at 15 seconds	Ditto	4 guns at 5 seconds....	
7	1 gun.....	Ditto	3 guns at 5 seconds....	Very quick.
8	2 guns at 5 seconds.....	Ditto	2 guns at 30 seconds ..	Badly fired.
9	2 guns at 20 seconds	Ditto	2 guns at 8 seconds....	
10	1 gun.....	Ditto	3 guns at 30 seconds ..	Not made out.
11	3 guns at 20 seconds	Ditto	3 guns at 8 seconds....	4 guns only heard.
12	1 gun.....	Interval of 60 seconds....	3 guns at 5 seconds....	Lost last part.
13	2 guns at 5 seconds.....	Ditto	2 guns at 5 seconds....	First 2 guns only heard.
14	3 guns at 5 seconds.....	Ditto	1 gun.....	1 gun missed at 5 seconds.
15	4 guns at 5 seconds.....	Ditto	4 guns at 5 seconds....	4 guns not heard.

22nd July, 1869.

1	2 guns at 10 seconds	Interval of 20 seconds....	2 guns at 10 seconds ..	Short interval good; the long hardly sufficient.
2	3 guns at 10 seconds	Ditto	2 guns at 10 seconds ..	Guns fired badly.
3	2 guns at 10 seconds	Interval of 30 seconds....	2 guns at 10 seconds ..	Good intervals, well marked.
4	2 guns at 10 seconds	Ditto	3 guns at 10 seconds ..	Good intervals, well marked.
5	2 guns at 7 seconds.....	Interval of 40 seconds....	2 guns at 7 seconds....	Fair interval.
6	3 guns at 7 seconds.....	Ditto	2 guns at 7 seconds....	Fair interval.
7	2 guns at 7 seconds.....	Interval of 60 seconds....	2 guns at 7 seconds....	Long interval too long.
8	2 guns at 7 seconds.....	Ditto	3 guns at 7 seconds....	Long interval too long.
9	2 guns at 7 seconds.....	Interval of 30 seconds....	2 guns at 7 seconds....	Very distinct.
10	2 guns at 10 seconds	Ditto	2 guns at 10 seconds ..	Very distinct.

The result we arrived at was that the 10 second interval was better thaneither the 5 or the 7, no guns being missed; also that the 30 second interval was so distinct a difference to the 10 second interval, it was unmistakable, besides not being so long as to appear as if it did not belong to the signal made like the 40 and 60 second interval.

With gun fog-signals there is of course a limit, until some one can invent a system whereby the firing of not more than 6 guns will give combinations for many thousand signals, at the same time making each one so distinct that it cannot be mistaken for another. Provided the length of time in making the signal should be of no object, of course if 10 guns could be used, any number of signals might be made, but the difficulty of the number of guns is very much increased now with the broadside and turret ships, those composing our fleets, as they carry but few and heavy guns, which guns should be used when possible; if not possible, the boat guns must be substituted. The principal signal makers in a fog, the flag ships, can use the guns they have for saluting purposes, which, taking into consideration their being used in a fog, ought to be 32-pounders.

After the experiments at Portland, Charles Brewer, the chief signalman of Her Majesty's ship "Minotaur," gave me a scheme for gun fog-signals, which I think the best I have met; taking the intervals we agreed on, he applies them very simply in the following way: all guns to form a number to be fired at intervals of 10 seconds apart, but in the case of a double number like 12 or 54, the interval between the integers to be 30 seconds. As an example 23, two guns with 10 seconds between them, an interval of 30 seconds and then three guns at intervals of 10 seconds, so that on hearing the guns a signalman can count 1, 2, these being fired with 10 seconds between; he then finds a much longer and well-marked interval, waits, and counts again 1, 2, 3, having also 10 seconds between, and knows the signal to look for is 23, turning to it at once. The great advantage of this is that the number of guns fired, gives the number of the signal made; now, in the present arrangement, one of the greatest difficulties, really I think the worst part, is that the number of the guns fired gives you no clue whatever to the signal made, that is to say No. 3 signal may be made by firing only two guns, No. 6 by three guns, No. 5 by four guns, No. 7 perhaps also is made by firing four guns, of course at different intervals to No. 5. Nos. 8 and 12 may both be made by firing five guns, hence the number of the guns fired, gives you no key to the number of the signal made, and the difficulty is so great, that it is no common thing for there to be many opinions as to the actual signal.

As I said before, there being a limit to the number of guns to be used—otherwise with 10 guns by Brewer's scheme any number might be made, provided the element of time was of no consequence—the number of guns and time being considered, five was taken as the largest number that should be used. Practically five is a large number, and all signals having the five in them should be those seldom necessary. The following numbers are composed by five, 1 to 5, 11 to 15, 21 to 25, 31 to 35, 41 to 45, and 51 to 55, giving 30 signals in all, against, I think, the 14 or 15 now in the signal-book.

To make any of these signals three guns at least are necessary; with the 12-pounder breech-loaders with which the experiments were made at Portland, two were sufficient, but with the larger broadside guns, four at least would, I think, be found requisite.

In dividing these 30 signals, 1 to 5 should be the important ones made under somewhat different instructions to the others;

11 to 15 relating to altering course;
21 to 25 to steam;
31 to 35 to tacking and wearing;
41 to 45 to hauling to the wind;
51 to 55 to be left blank.

Of course in selecting 30 signals for use in a fog, out of the thousands in the signal books, there will be much difference of opinion in a service like the Navy; but the necessary signals can always be arrived at by taking the opinion of the well known best Officers. I merely put these in as simply my own idea, to show the way I think the 30 signals might be divided.

Of the present few fog signals, it is quite time that some alteration were made. They were first selected for sailing fleets, and have been handed down with but very slight additions, and although perfectly sufficient for a fleet with the wind as the only motive power, and therefore as the wind is generally light in a fog, obliged to move very slowly and naturally likely to keep together, yet the case is quite altered as regards a steam fleet, something more being required. Even in the signals themselves, some are annulled by Act of Parliament, two still remaining to distinguish tacks,—a system abolished,—sailing ships being ordered to use a fog-horn, steam ships the steam-whistle, and ringing a bell distinguishing ships at anchor.

Time being an important element in the making of gun fog-signals, having fixed on the period to elapse between the guns fired, it is now necessary to fix on the period between the repetitions of the signal, and also between the different signals. There must always be a doubt of the bearing of a noise heard, especially when it is on either beam; ahead or astern the range is narrowed, therefore the leaders of columns only should repeat. This order of repetition is laid down in the present signal book, and one cannot do better than adhere to it; the guns to form a signal always to be fired from the same side, otherwise some guns might not be heard. The leaders of columns to repeat in the order of their divisions, allowing two minutes to be left between the last gun of the signal and the first of the succeeding repeater, should four minutes elapse without a repetition, the next in succession should repeat, and after the last repetition, four minutes to elapse, and then the signal to be carried into effect.

Having made a gun-signal in a fog, fresh signals should not be made too quickly, and unless actually necessary, generally speaking, ten minutes at least should be left from the last gun of one signal before the Admiral commences another. All the times mentioned both for firing the guns, and between the repeaters, should be the subject of much care, and be conducted with the greatest regularity, the firing

would then catch the ear at the right moment, causing no uncertainty as to the number of guns fired.

I mentioned, when selecting the numbers of the signals to be made by the five guns, that 1 to 5 should come under somewhat different regulations to the others, I will now take each one separately. No. 1, or one gun, to be Admiral's position, and answer to signals made, Admiral's answer I mean corresponding to the affirmative by day; this signal requires a note to say that the Admiral will fire his position-gun immediately he is overtaken by a fog, and after that, at the hours and half hours during the fog. In the present book there is a difficulty about this position-gun, for this reason I would put in the note. As it stands at present, it orders ships to continue under the same sail, but is only ordered to be fired every half hour, one Admiral fires his first gun half an hour after the fog commences, and continues to fire it at half hours from that time; another will fire his first gun with the first bell that strikes after the fog comes on, and continue to do so with each bell; a third fires immediately he is enveloped in a fog, then perhaps at half hours from that time, or perhaps when the bell strikes the hours and half hours—as I think it should be, and have in consequence put in the note. These differences of opinion are very bad, especially on this signal; the half hour gun being the main guide to the fleet, they are following their Admiral.

No. 2, or two guns, with the ten second interval between them to be the preparative, which preparative is to be made before all signals, except 1 to 5. One of the greatest objections to the present arrangement is that there is nothing to call attention; the first guns heard, though called preparative guns, not only being a preparation for the signal, but also the signal itself, having to be counted as a part of it, and being fired at the quick saluting time of five seconds, are continually being missed, and the purport of the signal is entirely changed. No. 2, the preparative, should stand alone, made and repeated in order by the leaders, two minutes after the last repeater the signal itself of which it has been the preparer, should then be commenced, every one would be on the *qui vive*, no noise, watches ready, and the signal with such elements of success, be taken in without doubt or hesitation.

No. 3, or three guns, at intervals of ten seconds, to be a signal to denote having shoaled the water suddenly; it can be seen why the two former need no preparative, and as this would principally be made by a private ship to the Admiral, who would answer it with his one gun, it would of itself be so out of the common as to cause immediate attention being paid to it, and indeed would be the only gun signal I would place in the book for a private ship to make.

No. 4, or four guns, at intervals of ten seconds, would also be better without the preparative, and should be entered as "Anchor instantly," this signal to be carried out immediately it is heard. Whenever it might become necessary to anchor a fleet in a fog, if you knew where you were, the signal should not be made until the right moment; if suddenly in soundings, the signal would be made and carried out immediately they were heard by every ship. Ships in a fog are not going very fast, especially in pilot water, they can almost instantly

drop their anchors, and should then commence to strike their bells as ordered.

No. 5 I would leave blank for filling in as senior officers may deem necessary while in command.

Although I advocate the advantage of a preparative before making fog-signals, yet the last three signals, following No 2, the preparative, as they do, would, I think, be so different, requiring different action, the advantage of having them would be lost if they had to wait for the preparative, with all the time that must be passed in consequence; I therefore leave them by themselves, adding, they should be repeated as necessary.

Regarding the answering of gun-signals; hitherto the answer to most of the signals has been muskets in quick succession *after* the signal has been complied with. This is really no answer at all, besides muskets are not loud enough to be heard. Others had to be answered by denoting the tack a ship was on, when the different tacks were ordered by Parliament to be distinguished, so that I take it the answers to signals were practically nil. In my opinion there should be no answer to gun fog-signals, for if made with a preparative, and with a given time for carrying out the signal, the fewer the guns fired, the better. In a large fleet with only three repeating ships, if every ship fired a gun in answer—remember a gun is the only noise that can be heard from one end of a line to the other—it would lead to such confusion, that it is better to trust entirely to the care and vigilance of those in the ships, than for the flag ship to be in an uncertain state of worry and excitement as to how many ships have or have not answered, and perhaps hesitate in performing what she had already ordered to be done.

As at present there is a limit to gun-signals, something is required in addition, for of the many thousand signals necessary for day and night, surely thirty will not be sufficient for all the exigencies of a fog.

This want can be supplied by the flashing-system applied to sound, using the steam-whistle, fog-horn, or bugle, enabling both general and vocabulary signal-books to be used intact, making as many signals in a fog as in clear weather.

Since the establishment of the "flashing-signals" by Captain Colomb, the harbour fog-signals, made in the same manner as the fog-signals for sea, have been entirely superseded by the use of the fog-horn on the flashing principle, and at sea it has been used at times on the steam-whistle and fog-horn; but there are no regulations as yet except such as Admirals in command of squadrons have made from time to time, and lately I have not seen the system so much used in a fog as in Sir Sydney Dacre's fleet, between 1863 and 1865; it is, however, a firm basis for fog-signalling, and should be carried out to its full extent.

We require, however, a more powerful noise than we have at present. The steam-whistle is not good enough, the fog-horn, or bugle not loud enough for a fleet at sea. The steam-whistles of all the marine engines I had ever seen, except high pressure boats, having been failures, generally commencing with a rush of water and ending in the faintest

possible scream, I made enquiries amongst engineers and engine-makers about the steam-whistles of our engines, as to why they were so bad? I found that as a rule they were not made as carefully as the delicate parts of the engine, but that it had been found out by some careful experiments that the distance from the cup to the dome must be in proportion to the diameter of the whistle; when made very carefully a powerful scream could always be obtained.

On my writing to Messrs. Penn, the engine-makers at Greenwich, saying I wished to find out the best steam-whistles, they very kindly lent me two for trial, one with a sharp scream, and the other with a deep tone; these I had fitted to the steam-whistle pipe of the "Bellerophon," and although water as usual came up first, still I was satisfied the deep toned one was the best.

Captain Goodenough, of the "Minotaur," one day pointing out to me a notice in the "Engineer" of a "Steam-Roarer," by J. Bailey and Co., Albion Works, Salford, Lancashire, I wrote to them, saying I was making some experiments, would they lend me a "Steam-Roarer" for trial; this they most kindly did, I had it also fitted, but in consequence of the pressure in the "Bellerophon's" boilers being very much reduced there was not power enough to develop its use, but trying it on the steam launch's engine in Malta Harbour, it produced such a scream as to startle every one. The chief pecularities of Mr. Bailey's "Steam-Roarer" may be described as follows:—

1st. The latest one is adjustable, and can be made to exert its highest power, for either high or low pressure steam, if used on a boiler with 15 lbs. pressure, lower the dome and diminish the distance

from A to B, and increase the distance as greater pressure is used. Altering the distance from A to B is done in a simple manner, by loosening the lock-nut at G, and turning the dome round.

2nly. The steam-way of the instrument is large, and instead of using a cock or plug tap, a full-way inverted valve is used, which is kept tight by the pressure of the steam, and the moment it is opened, the full pressure is on the instrument. By the peculiar lever arrangement on the top, a weight may be placed at one end, so that if necessary to fix it at any height the weight will close the valve on ceasing to pull at the chain or wire.

3rdly. There are very few parts in this instrument, and it is not likely to get out of order.

Since the "Bellerophon" paid off, I have been in communication with Mr. Bailey, telling him what is wanted, the result is the instrument just described, which, after being adjusted for the steam pressure, makes the sound as loud at first as at last, and is the very thing wanted for flashing-signals in a fog; it is used in some merchant steamers, and I hope Mr. Bailey will soon have it tried in the Channel Fleet.

There is yet, even with good steam-whistles, something to be done with the pipe from the boiler; the opening valve should, I think, be close to the boiler, instead of the whistle, but the handle still to be on deck, and there should also be a small cock for letting off any water there may be inside the pipe from condensed steam.

To be able to make flashing-signals on the fog-horn, Captain May, in the "Northumberland," the other day hit on a very ingenious plan. He had the steam launch's boiler filled with air by the air-pump of the diving apparatus, getting easily 15 lbs. pressure, and more if necessary; he then fixed on a fog-horn, and was able to get a good loud sound, sharp and well defined.

It will be seen by this that, having got the "flashing-system" for signalling, people require a good instrument to make the signals; and as some are turning their attention to it, I have no doubt ere long our ships will be able to communicate with one another in this manner easily from one end of a fleet to the other. Flag ships in particular ought to be first of all well fitted with steam-whistle or roarer, and fog-horn. In making a flashing-signal in a fog, it can be used either by itself or in conjunction with a gun-signal; in harbour it should only be used, the ships being much closer together. At sea all signals from the general and vocabulary signal-books, except the thirty selected for gun-signals, should be made by the flashing-system, and when good instruments are supplied, an Admiral may make sure his signals are as well understood as if made in clear weather with flags. When the Admiral makes a flashing fog-signal, ships nearest to him should answer first, the rest in succession, repeating for safety, all signals from the general signal book, and answering only all signals from the vocabulary signal-book. Should a ship notice that her next astern, does not answer, she should repeat again, if necessary with her pendants. The leaders and regular repeating ships of a squadron need not repeat "flashing-signals" except in the manner just mentioned. If the squadron

is in a single column, it is a very good plan to repeat the signal, whatever it may be, down the line, and then repeat the answer from the sternmost ship back to the Admiral; by that means the Admiral knows that all the ships understand his signal. These signals should be governed exactly by the same rules as "flashing-night-signals," but in case of ordering an evolution, for commencing which at night the Admiral shows position lights, or burns a short signal-light, he should in a fog, when all ships have repeated, fire his position gun, then, four minutes from that time, the evolution is to take place.

By the Order in Council for "Preventing Collisions at Sea," sounds on the fog-horn denote being under sail, on the steam-whistle being under steam, and ringing the bell being at anchor. Nothing is laid down as to the particular sounds to be made, so those most conducive to order and safety can be used. At present it is the habit for each ship to sound her pendants on the flashing principle; but as ships wish to communicate by the same principle, there is a difficulty. According to the rules, the ship making the signal has to commence and end her signal with the pendants of the ship spoken to, causing some confusion to other ships, which might only hear the pendants part of the signal. And in case of ships in different lines signalling to one another, it would exactly seem as if they had changed places, the ships astern or ahead of each, would at once think they had by some unaccountable means got over to the other line, and if commanded by anxious men, try, as they thought, to hark back; they would get hopelessly involved, and unless the fog lifted, would end in their losing the fleet altogether.

If my memory does not fail me, when the late Lord Lyons took one of the Kertch expeditions, I think the second, with the Turks embarked, we were all one day in a fog, and the few large ships in the little squadron ringing their bells, struck the number of their seniority, the Admiral's ship striking 1, the "Hannibal," 2, the "Algiers," 3, and so on. This struck me as being such a good way of distinguishing ships in a fog, that I would direct ships in a fleet in a fog, whether they use steam-whistle, fog-horn, or bell, always to sound their fleet numbers; by this means, while acting in accordance with the Regulations for Preventing Collisions at Sea, there would be no confusion in making another ship's pendants when wishing to communicate.

It is a matter of some importance to be able to communicate freely with another ship in a fog. In the "Bellerophon," in August, 1869, with one of Messrs. Penn's steam-whistles, lent to us, we were able to find out from the "Hercules," at least 10 cables off, the direction of the Admiral, and although not in his line, we easily picked up the wake of our next ahead, the "Northumberland," which ship had fast hold of the leader of our line; thus when the fog cleared off we were in our place.

There is one case, however, in which I think special sounds on the fog-horn or steam-whistle should be laid down, and that is in passing from one tack to another, whether under sail alone or under steam and sail. It is then more important to know what tack an approaching ship is on, than what particular ship she may be; directions should be given thatd uring this evolution *only*, ships on the starboard tack, should make a series of long sounds, and ships on the port tack, a series of short

sounds, referring back to their fleet number when the evolution is over, of course using the fog-horn for sail only, and the steam-whistle when under sail and steam. By these means I think perfect signalling may be maintained in a fog. There should also be some instructions that Officers may not only easily find out how the "fog-signals" will be made, but also what they have to do in a fog themselves. The Order in Council for "Preventing Collisions at Sea" being paramount, its directions must be carried out in the signal-book. The speed is laid down by the Order, and is not to be more than from three to four knots. It is a safe speed, as it enables a ship to stop easily and quickly, and should of course be used under ordinary circumstances; but in the exigencies of our naval service, it may often be necessary for a fleet to proceed faster, and arrangements must be made in order to meet a greater speed. It should also be laid down *when* the Admiral will reduce speed if going fast at the commencement of a fog; should he even wish to continue at the same speed, it would be better as the fog came on, to fire his position gun as directed, and four minutes after the last repeater, reduce to the regulated four knots. The fleet would then close up, and by steam-whistle he can state the speed, or the number of revolutions he intends to proceed at, but under ordinary circumstances, of course the fleet is bound to proceed at the laid down speed.

Whenever there is appearance of fog and it is practicable, the fleet should be formed in single column in line ahead, and in close order.

Firstly. Because in line ahead there is less danger of fouling.

Secondly. Station in a fog can be so much better kept in line ahead.

Thirdly. Signal communication can always be kept up, and

Lastly. The fleet can go at a greater speed if required than four knots, with more certainty of keeping together.

The most easy position in which you can be placed at sea to keep clear of another ship, is when coming up astern, whether in day time, at night, in a fog, or thick weather. This, I believe, no one can gainsay; by putting the ships in single column in line ahead, all ships are coming up astern of one another. Keeping station in a fog when in line ahead is always much easier than in any other formation, for the reason that even in so dense a fog the ship ahead cannot be seen, as there is generally but little wind and smooth water, the very wake of the next ahead can be seen and steered in. By putting the ships in close order in line ahead, there can be no doubt on the part of the Admiral that all ships in turn understand his signal, and should a ship be missing, which would be known by her not repeating or answering the signal made, it can be reported to the Admiral by her next ahead; this will give him greater confidence if he wishes to alter course, increase or decrease speed.

The single column formation, having all the above advantages, enables the fleet to proceed at any speed that may be necessary for the fulfilment of orders; that I am not advocating this without experience, I must relate an incident in the life of the Channel Fleet.

In September, 1865, when that fleet was commanded by Sir Sydney

Dacres, on its way from Spithead to Bantry Bay, a little outside the Nab Light,—being then formed in single column in line ahead,—the ships became enveloped in a fog. It was in the evening when this fog commenced, lasting nearly 36 hours, the Fleet steamed down channel at more than 5 knots speed; one ship was known to be missing before the fog lifted, and when it did lift, the ships, with the one exception, were in their stations. Signal communication had been kept up the whole time, and no land was seen from leaving Spithead until the Mizen Head was sighted on the coast of Ireland. The easy and admirable way in which the "Hector," next astern of the "Edgar" kept always just in sight, I shall never forget; at times she was within 20 yards of her leader's stern, and then would drop until almost out of sight, but with pride those in the "Hector" may, I believe, say, they never really lost sight of their leader in that fog.

It is, I think, a wise precaution that during a fog, the fleet if under sail, should always maintain the same order, and continue on the same tack as when the fog came on, even if the wind changes its direction, until it is ordered by signal to do otherwise; this removes any question of doubt that might arise in the minds of officers in command of ships; also in the case of a breeze springing up after a calm, which would prevent the fleet proceeding as before; the Admiral would first come to the wind by signal, on the most advantageous tack, and then, if the wind be favourable, after he is sure all the ships are on the tack ordered, keep away to the course intended. This seems a roundabout way to get to a certain course, but as to all ships when under sail a certain number of points are shut, on the principle of "the longest way round being the shortest way home," it will be easier and safer for all ships to get on one tack first, and then bear away to the required course in succession. In tacking under sail in a fog, great care will have to be taken, in noting particularly the time of the last repeater, making sufficient sail to ensure tacking, and then in reducing sail again as soon as about, so as to proceed at the proper speed, and to signal carefully the tack the ship is on. Although in a fog, such few evolutions as may be performed, should be carefully carried out, as laid down in the signal book.

I speak of evolutions, but am perfectly aware they must be of the most simple description, and of such a nature as to cause the least possible risk to the ships in their performance; care should be taken to make them successive, and not simultaneous, for the reason that risk of collision is lessened when following a ship. What the evolutions actually should be, must depend on the signals at command and the circumstances of the case; it is a subject on which no rules can be laid down, but must be left to the ability of the Admiral, aided by the intelligence and activity of his captains.

On a ship of the fleet discovering any danger, she should immediately fire guns in quick succession, and if necessary to make a movement to avoid the danger, she should fire a position-gun at intervals, to show how she is standing to avoid it; if a ship should actually strike the ground, besides firing guns while ashore, she should also fire rifles, beat drums, sound fog-horns or steam-whistles, making all the noise

she can in fact, so that every one may be attracted by her unusual proceedings, and avoid closing nearer the sounds heard.

In case of it becoming necessary to anchor a fleet, as the ships drop their anchors they should strike their fleet numbers on their bells, and continue to do so until all the fleet has anchored.

After all it will be seen that I advocate no new principles in the "fog signals" for the Navy, but believing that those now in use, have certain shortcomings, and are not sufficient for the wants of the present day, and having noticed that as the matter stands, the signal staff of ships appear to partake of the nature of the surrounding atmosphere, never seeming quite clear, for what they should look out—a gun being fired, causing them bewilderment—also, having seen Officers turn to the signal-book expecting to find everything ready to their hand when *in* the fog, I think the Navy requires a very clear and simple "fog-signal-book." Of course both Officers and signalmen should know the "fog" as well as other signals in use; when they do not do so, they feel their ignorance, and are in consequence wanting in that self-confidence which ensures promptness of action. This evil is lessened as the signal-book is clear and simple, but it is much increased as the thing stands at present, there not being clear and concise information of what is to be done and how ships are to act; and on any gun-signal being made, particularly from the quickness of the guns fired at first, there is very often some difference of opinion as to the actual number fired, and therefore of the signal made; in consequence Officers in command fear to make a decisive movement, the fleet becomes scattered, and if the fog lasts, some ships are missing at its close.

Advocating no new principles, nothing is required except that the old signals should be simplified, modernized, and extended, and the "flashing-signals" ordered to be used.

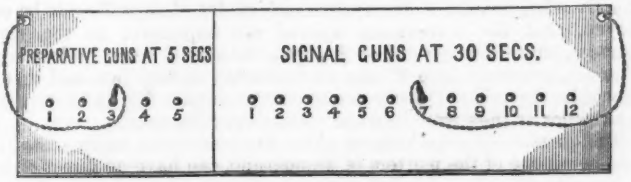
I would add a few more instructions, and think it would be a benefit if the signal book stood thus:—

1. Instructions relating to fog-signals.
2. Instructions for the conduct of a fleet in a fog.
3. Gun-fog-signals.

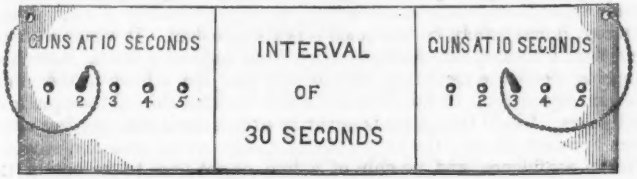
The instructions relating to "fog-signals" should describe and direct the different methods of signalling, commencing with the gun-signals as the most important, and ending with the "flashing-signals" by the steam-whistle, bugle, or fog-horn. The instructions for the conduct of a fleet speak for themselves; in them I would embody all that I have before stated, to enable a fleet to keep together however long a fog may last. The "gun-fog-signals" should indicate some few selected signals, leaving all else to the "flashing system," pre-supposing every care has been taken to furnish the ships with the best instruments.

No fog-signal books are complete without one of Admiral Ryder's markers; a small board with two divisions, in each division holes, and a peg at each end, the first or left hand division marked "Preparative guns at five seconds," the right hand division marked "Signal guns at thirty seconds."

For every gun heard at the various intervals, you place the peg in a hole, and when the signal is finished, you have the number fired



before you. This board can be made on board any ship, and should be kept in the bridge-house; Captains will find it useful to keep one handy in their cabins. Whatever intervals may be fixed on, can always be adapted to this marker, with what I propose, the board would be in three divisions, the right and left with holes for the "guns at ten seconds," and the centre being merely marked "interval of thirty seconds."



After the signal is made, with this method, you would see before you the number of the signal to turn to, instead of having by the present arrangement to look through all the signals to see the number that has been made; this is perhaps a small matter, but it tends to settle the doubt of how many guns have been fired, and gives confidence to carry out a signal.

Whatever fog-signals may be established, and there has been a committee lately which will shortly give the service the results of its labours, no books or systems are of much use unless the fog-signals are *practised* when the fleet is not only in harbour but at sea.

I hear in future that the signals for a fog are no longer to be called "fog-signals," but "gun-signals," to let people know that they need not necessarily wait for a fog to use them; this is an exceedingly good idea, as it will tend to familiarize signalmen with this means of signalling. To exercise the "fog-signals," the Admiral should inform the fleet what he is about to do, making not only gun but flashing-signals, and every ship should send in to him on paper what they had taken in; this would prevent the startled effect a "fog-signal" now produces.

However perfect a signal-book may be made, there is a part which may be called the seamanship of the question, which cannot be laid down, but must be left to those in charge of our ships. I am quite aware that in a fog suddenly coming over a fleet, great caution must

be displayed, and the most vigilant look out kept, but I do not think in a well-ordered service, with the means now-a-days at command, a fog should cause the slightest fear or hesitation, all should know exactly what to expect, the system and modes of signalling to be employed, that the movements ordered are imperative at the right moment, that on seeing one of the fleet, she should never be lost sight of again, however close it may be necessary to hug her, and that it should be the pride of every one to emerge from a fog in exactly the same order as they were in when it enveloped the fleet.

The question of ships keeping close to one another when seen in a fog, being one of the matters of seamanship, can have no direct orders in the signal-book, and is left to those who may have charge of ships. There is no hint even of closing on your next ahead, and the tendency is rather to go slowly and open from her, indeed I have often noticed a decided desire on the part of Officers to get away from and lose sight again of any ship that might approach near enough to be seen. This ought not to be, as the ships are under steam almost as a rule in the large squadrons. As fogs principally come on when the wind is so light that the ships are quite unmanageable, they generally cruise with fires banked, if not regularly steaming at the time; every Captain therefore would immediately have steam ready, so that in treating of a large fleet in a fog, it may safely be presumed it is a steam fleet. It was in a steam fleet that I noticed the desire to open from anything seen, instead of hugging close the next ship, and as she can see a little farther than you, it may at least be hoped that she sees another ship of the squadron, and so on. I hold that there is never an excuse for a ship getting away from her next ahead; the very wake of a ship can be seen and steamed after in confidence, and no ship of a line, ought ever to be out of the line, however long a fog lasts. The other part of the seamanship question consists in the care taken on board the ships; the look-out should be vigilant, generally low down, but it is as well at the same time to have a man at the masthead. I have known instances when the mastheads of other ships could be seen from aloft, and some when a man slung in a bowline close down to the water could see their hulls. There should be more than one look-out man, and the water should be carefully looked at, as it enables you to see if you are following a ship. Perfect silence should be kept on deck; if any of the ship's artificers work there, they should cease in their work; as many of the signal staff as possible should be on deck, one of them with the fog-horn or by the steam-whistle; and a careful Officer be ready holding a watch with a second hand and the marker, to note the guns and the intervals at which they are fired. The speed should be carefully attended to, and if under steam, the engineer officer of the watch warned to stand by his engines as the ship is in a fog. Above all I would impress on every one the great necessity the instant a fog comes on, or better still if seen coming on, to close on the next ahead, and having once caught sight of her, if it entails the jib-boom literally over her stem, never once losing sight of her again, stick to her; it is right in the first instance to allow nothing to throw you out of your place in a fleet, it is creditable to preserve it under all circumstances, and it gives a confi-

dence and pride in the ship to all on board to see that whatever happens, she emerges from the trial, in close contact with her consorts. These are things which no signal-book can lay down, they rest entirely on Officers, on whom lies the responsibility that the fleet shall not get scattered.

Before concluding, let me read to you a summary of fogs reported from Penzance, Plymouth, Portsmouth, and Yarmouth, for the years 1868 and 1869. Writing to Mr. Robert Scott, M.A., of the Meteorological Office, on the subject of fogs, he most kindly had copied out and sent me the wind and weather log, when fogs occurred during the two years above mentioned. From this log I am able to give you the following :—

In 1868

There were—

At Penzance, 13 fogs.
At Plymouth, 17.
At Portsmouth, 7.
And at Yarmouth, 9.

Of these the following numbers occurred during calms :—

At Penzance, 3.
At Plymouth, 13.
At Portsmouth, none.
And at Yarmouth, none.

The greatest force of wind in these fogs was—

At Penzance, 7, with an average of 2·9.
At Plymouth, 5, with an average of ·5
At Portsmouth, 2, with an average of 1·2.
And at Yarmouth, 3, with an average of 2·6.

The months of January and November had each 7 fogs between the above places, but in May none were reported from either place.

The fogs in 1868 seem not to have been of many hours' duration. There were fogs reported of 2, 3, 4, and 5 hours, but only one of 24 hours, at Penzance, on the 7th March. Besides the above times, it was twice noted as foggy in different parts of the British Isles.

In 1869

There were—

At Penzance, 23 fogs.
At Plymouth, 31.
At Portsmouth, 12.
And at Yarmouth, 19.

Of these the following number occurred during calms :—

At Penzance, 3.
At Plymouth, 19.
At Portsmouth, 9.
And at Yarmouth, none.

The greatest force of wind in these fogs was—

At Penzance, 6, with an average of 2·3.
At Plymouth, 2, with an average of ·5.
At Portsmouth, 2, with an average of ·3.
And at Yarmouth, 5, with an average of 2·2.

There were 20 foggy days in November, but May and June had only two foggy days each, between the above places. 1869 may be taken as a very foggy year. The longest fog occurred at Penzance, commencing at 7 p.m., of the 9th October, and lasting until 2 p.m., of the 12th; 67 hours with no wind at its commencement, the wind gradually freshening, until it was registered 3 as the fog dispersed. Penzance had besides this, on the 8th and 9th of April, one of 48 hours; on the 11th and 12th of April, one of 36 hours; on the 16th of July, one of 24 hours; on the 8th of July, one of 12 hours; and on the 18th July, another of 12 hours.

Plymouth had on the 15th March one of 10 hours, and on the 11th of October, one of 24 hours.

Portsmouth had one long fog, on the 18th and 19th of November, of 38 hours, otherwise the fogs were not so long.

Yarmouth had, on the 7th and 8th of January, one of 31 hours; on the 21st and 22nd of January, one of 31 hours; on the 28th and 29th of January, one of 36 hours; on the 18th and 19th of November, one of 22 hours; on the 25th and 26th of November, one of 33 hours; on the 28th and 29th of November, one of 31 hours; and on the 10th of December, one of 10 hours; beside the above times there are twelve notifications during the year of fog being prevalent at times in parts, and at others over the whole British Isles.

It may be said I have made too much out of a small matter, bringing forward nothing very new, and that in spite of such fogs as I have just read of, no accidents can be remembered that have occurred amongst fleets in a fog, although "fog-signals" have for many years formed so small a part of our signal-books. I grant all this, but knowing that some Officers have been wishing for something more in the way of "fog-signals" than we have at present, and that the means of communication between ships in a fog have improved, I have turned my attention to the matter, and think the alterations I should like to see made, if compiled and issued to the service, would be an advantage; at the same time in point of printed matter, there would be very few pages in excess of that now in use, while, for simplicity and usefulness, the service would be the gainer.

Let me ask you to turn your attention to the great war now raging on the Continent, and we see that the conquering power has been the one that I may say, has descended to small matters; everything is arrang ed, even to the most minute details; not a thing forgotten, and by this very means the German nation has ascended to a power and might unparalleled in history. Belonging as we do to the greatest maritime nation, we must not let the lesson pass us, but enter into all minute points, see all small matters as well arranged in their way as large; for a fog might some day prove a very serious matter to us.

Let me put a case: two squadrons, from two different naval ports, are required to meet as day breaks at some appointed spot, ready to strike a necessary, well-timed, and effective blow at an enemy; one of these squadrons encounters fog, and by not being well instructed and prepared for such a thing, goes slowly, perhaps stops, and ends in becoming scattered, with some ships missing. This squadron cannot arrive at the proper time, and the operation is worse than useless, for your opponents have seen something of your strength and strategy; or take a case worse still, viz., that of a squadron sent in haste to prevent some attack on ourselves, through being scattered in a fog, arriving at its destination too late. May the fall of the great military power of France, considered until now the first in Europe, and corresponding to the naval power of England, be a warning to us that we cannot take too much trouble with our Navy in all its points.

Admiral Lord FREDERICK KERR: May I ask our friend if he knows the duration of the fog which he alluded to in 1865.

Captain BRENT: About thirty-six hours.

Lord FREDERICK KERR: I happened to be in that fog, and I should like to make an observation in confirmation of what Captain Brent has said, or rather to enlarge upon the point. You remarked that the fog fell upon the ships *after* rounding the Nab, when they were in single line, I think. The fleet *was* in single line, having left Spithead with a bright sunny sky. It was one of the most beautiful days ever seen; yachts were sailing about in all directions. No signal had been made for rendezvous, as we had been sent to sea under sealed orders, not knowing our destination or rendezvous. We left in line-of-battle, the lee column, or port division, being in rear of the starboard division. There were six or seven ships, and we were about three miles from the Nab, having just passed through St. Helen's, when the fog fell suddenly on the ships so thickly, that we could not see the next ship ahead. It was then a critical time for the use of fog-signals. We had to judge our distance, and the right moment for rounding the Nab, for we were going down Channel. No signals had been made for rendevous. The difficulty would have been lessened *after* rounding the Nab, and I may mention this to point out the circumstances in which signals might be advantageously used. I was the leader of the lee line, consequently I was in the centre of the line when in line-of-battle. When, as we concluded, we had reached the Nab, and it was about our time for rounding, it was reported to me that there was a whistle on the starboard bow. Gentlemen probably know the position; the Nab is on the starboard side, and the whistle was on the starboard bow. We concluded it was the Admiral's whistle to signal that he had altered his course and had rounded the Nab. Accordingly, we also altered our course, supposing we were following our leader. The ships were about two cables apart when the fog came upon us, or perhaps more. After altering course and proceeding in this direction for about five or ten minutes, having rounded the Nab, the look-out man called out, "there's the splash of a screw on the port bow!" so there was something not very far off on the port bow; no other sound was to be heard. The order was given to "ease;" at the same moment I looked, and I saw the jib-boom of a ship plainly in the fog, just hanging over our port quarter. By porting the helm in time the ship cleared us. We were at a loss at the time to know how we got into that position, but it turned out that the whistle we had heard was not the Admiral's, but of some casual passing steamer, and by altering our course so much sooner than our leader, it led eventually to our cutting through the line between the Admiral's ship and his second astern. Having overcome that difficulty, very shortly afterwards occurred another circumstance which I will mention to show on the other hand the advantage which has been derived to the Service from Captain Colomb's flashing signals as applied to steam. We had not then had any orders to practice with these signals, either with fog-horns or with steam. Some experiments had been made with fog-horns, but to the best of my recollection this was the first time experiments were

made with the "Flashing Signal Code," by steam. Signal was made by the Admiral first to "form two columns," and in the next place to "rendezvous off the Lizard" (or off Scilly), and giving the course down Channel. The signal was given with the steam-whistle, and it was repeated by ourselves as the leading ship of the other division. We formed the two columns, and we were kept together by 15 minute guns, from the Admiral, repeated from the leading ship of the lee line, for we never saw anything of each other until we got down nearly off the Eddystone, going six knots all the time. There was only one ship missing, which had thought it right to leave the line and go in shore. I mention this to show how much the service is benefited by Captain Colomb's signals not only in the night time in clear weather, but in their application to the steam-whistles of ships in times of fog.

Captain COLOMB, R.N.: I must express my regret that I did not bring down with me a book which I intended to have brought. It is the "Experimental Night and Fog Signal Book," which I believe is now issued to the Channel and Mediterranean fleets for trial. In that book by far the greater part of Captain Brent's suggestions have been adopted. The suggestions were, on the face of his reports, so absolutely necessary, and their necessity was pointed out so clearly, that the Committee, of which I was a member, adopted the greater part of them without any dissent whatever. But there were certain parts which were not adopted, and I think the questions as to those parts still remain open. Captain Brent suggested that the best interval at which the signal guns should be fired was ten seconds between the first guns, then an interval of thirty seconds, and ten seconds between the second series of guns. The Committee, however, thought that as we had only those experiments before us, that we should not be justified in making a change from the interval so long established in the Navy. My own wish would have been that further experiments should have taken place, because the circumstances, as Captain Brent has pointed out, under which gun-signals are now made, are very different from what they were at the time those intervals were established. We have now to deal with ships such as the "Monarch," with four heavy guns. Those heavy guns must be used for the "fog-signals," because, as the lecturer has pointed out, you do want the very loudest guns you can use. It follows that it is almost impossible to conduct your signals at intervals so short as five seconds, which, if my memory does not deceive me, is still the established short interval. I think these remarks embrace nearly all that can be said on the spur of the moment as regards "gun-fog-signals." As regards "flashing-signals" when used in fogs, I think nearly the whole of Captain Brent's suggestions were adopted in the Experimental Book. But I agree with him that that branch of the subject is still quite in its infancy. I cannot doubt that it ought to be possible in these times to have a sound flashing instrument, which would be capable of conveying signals between two columns, situated at their ordinary cruizing distance apart. As we stand now, when a fleet is in two columns, they are cut off from one another; one column is cut off from the Admiral, except in respect of the few gun-signals which can be made. I see no reason why if inventors' attention were sufficiently turned to the subject, we should not have "flashing-fog-signals' capable of traversing the distance between the two columns, and so keeping up that complete communication which is so necessary in fleets. I do not think that any naval Officer will imagine that the subject which Captain Brent has treated of, is a small subject. To my mind the safety of the country may at any moment depend upon a fleet being kept together in fogs, and being properly under command of the Admiral. And when one comes to think what is on the other side, what is against our having a fleet so in hand, and so kept together, we shall see that it is worth investigation. Practically, no experiments in "fog-signals" have ever been tried, except those stated on the board before us. I never heard of any having been tried myself, and I never met with anybody who ever tried any "fog-signals." We generally say, "Oh, the thing has answered very well for so long, and it will answer very well for so much longer;" and we go no further in the matter. The history of the thing is that the fleet never gets into a fog on any occasion without mistakes being made; and sometimes those mistakes lead to very great misfortunes, such as the separation of ships. I cannot at the moment give a case where this has happened in fogs, but I can give a case where it happened respecting the old "night-signals." It became my

business, when I was commencing the study of the subject, to find out really where it was that the old "night-signals" failed, because I thought when I arrived at that point I might know what was wanted. Therefore I made it my business to go on board every ship in the Channel fleet whenever I could, and wherever I could. On many occasions I found that the first answer given to me was, "Oh, there's no difficulty at all, the thing answers perfectly well." "There were no mistakes then?" "No." But I never found on any occasion when I pressed the question home, that mistakes did not occur, and that quite recently. On board the "Donegal," in Plymouth harbour, I went just after the Channel fleet had arrived. I said to the signal officers, "What about the night-signals—have you any fault to find with them?" "Oh, no; they answered perfectly well." I said, "Don't you know of any mistakes having been made at all?" "No, none at all; they answered perfectly well." I said, "Let us look at your signal-log." They got the signal-log. I said, "That signal, for instance," pointing to one made two days before, "was that right?" The answer was, "No, that was not right; it was a signal to get steam up, and we took it to be a signal to steer south-west, and we parted from the fleet in consequence." The fact is, that in the Navy we seldom take note of mistakes once they are passed; and until we establish something like systematic experiments, such as we have before us, we shall not succeed in getting a perfect system of fog-signals, nor in fact succeed in getting a perfect system of any kind.

The CHAIRMAN: Before returning Captain Brent our thanks, I should like to make an observation or two. In the tropics we very seldom have any fogs at all. The fogs are confined very much to the Channel, the North Sea, and the Baltic; although of course they occur elsewhere. It is only since the Channel Fleet has become an institution that we have thought much about the fogs, at least in my recollection. Two instances were mentioned just now as cases in point, where the Fleet was in a fog a long time and was kept together. I can give an instance where we were separated in an hour in a fog. We were six or seven ships off Lisbon. A fog came on very rapidly. Signals were made by the Admiral to take the ships out of danger. The signals were so entirely misunderstood, that when the fog cleared two hours afterwards, the Fleet was scattered about in all directions. That was entirely owing to the guns that were used for fog-signals being quite incompetent. Formerly, we used to employ 32-pounders, which had a charge of 6 lb. of powder, and with the 6 lb. of powder we could hear well from one column to the other. But these guns were supplied with a charge of 1 lb. 8 oz., at all events so small a charge that we could not hear them distinctly. It was with the very greatest difficulty, by making everybody quiet, and by putting your hand to your ear, that you could hear at all, owing to the blocks and ropes rattling about. I think the mistake arose from the guns being *too small* for the purpose. If we are to have *gun*-fog-signals, we must have proper guns for them. In the case of ships with only a few guns of from 9 to 25 tons' weight, I believe it will be impossible to fire fog-signals, remembering that many of the guns in some cases consecutively have to be fired at five seconds intervals. This is perfectly impracticable, especially as the guns must be fired on the same side of the ship, and with great accuracy. If we are to have gun-fog-signals, guns must be supplied for the purpose, and they must have charges of at least 6 lb. I believe that is at the bottom of the whole question. But to secure effective signals, we ought to have a proper screamer. At present the Admiral has no power to speak to an individual ship, however much he may wish to do so. I have suggested a method by which the Admiral might with the *gun*-fog-signals ascertain how many and which of his ships, if any, are in company with him, and the approximate bearing and distance of each. At the end of say every two hours, viz., at two, four, six, eight, ten, and twelve, let the Admiral, if he wishes to ascertain the position of his ships, fire four minutes after the half-hourly fog-gun the following guns, viz., two guns with a minute interval. Each ship has now a fleet number, the Admiral is No. 1, the ship astern of him No. 2, the leader of the lee line No. 5 if there are four ships on the weather line, and so on. Then if the ship whose fleet number is 2 fires her answering gun at exactly two minutes after the Admiral's gun is heard, the ship whose fleet number is 5, exactly five minutes after the Admiral's gun is heard, and so as the Admiral will, by the interval in minutes, know the ship, by the direction

of the report know her approximate bearing, and by the number of seconds over and above the minutes know the approximate distance for this number of seconds; halved and multiplied by 4½ will give the miles; in distance, the whole fleet's position may be plotted on paper, although none can be seen. If, however, the Admiral wants to send a ship on any particular duty, or to call a small ship to him, he has no means of doing so by the ordinary gun-fog-signals, for they only speak to all the ships at once. If we had proper screamer-whistles, the Admiral would be able to speak to any ship he likes, by long and short screams, as in the flashing-signals. The reason why we cannot have efficient *steam*-fog-signals is because the steam has not enough pressure. We have only about 30 lbs. pressure; in a locomotive you have 100 lbs. pressure, and then you get a good whistle. Until we take the thing properly in hand, and have something like a high pressure steam, or, what is much better, compressed air acting under a pressure of 100 lbs., I am sure we shall never get a proper whistle to serve as a signal. Admiral Inglefield's hydraulic engine might easily, when fitted for steering purposes, be adapted for compressing air for fog-signals when requisite. I beg to return our thanks to Captain Brent for his exceedingly instructive paper.

The CHAIRMAN: Will you now reply to the questions?

Commander BRENT: I think the questions have been nearly all answered. The fog which I referred to lasted about 36 hours. I believe if there had been an instrument like the steam-roarer in the fleet, there would have been no difficulty in making out anything; any signal could have been made out. The thing is to get a good steam-whistle, something that will make a good scream. Mr. Bailey's is the nearest to it that I have seen yet; it is much louder than any steam-whistle.

The CHAIRMAN: The same pattern?

Commander BRENT: It is the same description. I wish we could get some of these tried in the Channel Fleet; it would soon settle the question.

Captain BURGESS: What is the pressure required?

Commander BRENT: You can use any pressure. I used 40 lbs. at one time in a steam launch, and the sound was most startling. This was in Malta Harbour. But with the low pressure of 15 lbs. it was nothing. I agree with what Captain Colomb has said about experiments. It is a pity there are not more experiments. I believe if people would make experiments they would arrive at the ten seconds and thirty seconds interval. The reason is, that the thirty seconds is divided by the ten, and it fell on our ears so distinctly that we took to it at once. I was, unfortunately, Commander of a ship at the time. I say unfortunately, because I had a little difficulty in getting the boats to make the experiments. It was a little out of my regular duty, and I was very glad, when we arrived at the intervals that we agreed to as best, to say, "I will do no more." But I think other people should make experiments. I am convinced that if they did they would fix upon the ten and thirty seconds interval. I have not a doubt about it. I have nothing more to say, except that I return my best thanks for your attention.

Evening Meeting.

Monday, February 20th, 1871.

Admiral of the Fleet SIR GEORGE ROSE SARTORIUS, K.C.B., in the Chair.

NAMES OF MEMBERS who joined the Institution between the 14th and 20th of February, 1871.

ANNUAL.

Trevelyan, H. W., M.-General R.A.
Pusey, E. Bouverie, Comr. R.N.
Macneil, J. G. R. D., Lieut. 41st Mad. Nat. Infantry

ON THE TRUE ECONOMIES OF ENGLAND'S NAVAL POWER.

By Captain J. H. Selwyn, R.N.

In the year that has just passed away, there has been suffered by the Navy of England a great and extraordinary loss. A lesson of unprecedented severity has been taught to all who are connected with England's Naval power. That loss and that lesson should now produce their legitimate and only useful effects, and this will not be the case, should vain regrets over the past, or still more vain recriminations in the present, be allowed to take the place of due precautions for the future, or of calm scientific enquiry into the occult causes of disaster. My purpose, therefore, in this paper will be to consider the *false economies* that have led, or that may still lead, to such evil results, and the *true economies* that may almost certainly prevent them. In doing this, I shall not confine myself to the consideration alone of such failures as that of the "Captain," but I shall attempt to notice some of the most obvious changes that may be and ought to be made, in order still further to develop and secure that important basis of the greatness of this country, which is found in her Naval power.

I shall commence by observing, that of all unwise economies, that has ever been held to be the most foolish, which to secure a slightly or

even considerably lessened cost in the first instance, sacrifices the real efficiency of the thing constructed. Such a case arises when we construct any new type of vessel on the large scale, without exhaustive previous experiment on the small scale. Such a case arises when for the sake of a lessened cost of ship, we reduce the number of day's fuel *at full steaming power* carried by a man-of-war. Such a case arises again when, to reduce estimates for coal, we prevent the acquirement of that knowledge by the officers who have to use those men-of-war which can alone obtain a successful result, when their right use has become a vital necessity. Such a case always arises when, to satisfy a popular clamour, we cut down votes for the purposes of experiment; we discourage and attempt to rob inventors; whenever, in short, we persist in doing things the wrong way instead of bending all our energies to the discovery of the right mode of action, simply because it is less troublesome to follow beaten paths even at the cost of going astray from our real object, than to understand those who press on our attention a new road to success. If, instead of issuing an order to abstain on all but special occasions from the use of steam, an offer were made of a reward for, or even interest were shown in, the proper utilization of fuel, science would not have to regret the fact, that in our Navy only half the true evaporative power—only half the mechanical duty of which even our present fuel is capable, is ever ordinarily obtained in practice—and our Officers would attain a knowledge of steam tactics with no greater expense than at present. I draw attention particularly to the latter fact, for a fact it is. Numerous British merchant steamers have been running for years, and one corvette in the British Navy has been running for months, developing just twice the mechanical power, with the same consumption of fuel. H.M.S. "Briton" has been able, by the adoption, in a moderate degree, of the improvement of which I speak, and which has been known and practised by the mercantile marine for some time, to burn less than 2 lbs. of coal per indicated horse-power instead of 4 and $4\frac{1}{2}$, which is the consumption of other, even recently built, vessels of our Navy. In other words, if we take the case of a vessel of 800 nominal horse-power, which would ordinarily burn 75 tons a-day at full steaming, the same power is now obtained by one, and ought long ago to have been obtained by every ship in the Navy by the expenditure of 35 tons only. The improvement I refer to, is, that known as the compound engine, but which really depends solely on the use of a higher pressure in the boiler, for its satisfactory results. When steam pressure in the boiler is as high as 80 lbs. instead of 25 lb. or 30 lb., as we are now using, there is this great difference: at the pressure of 80 lb., the temperature is 324° F., instead of with 25 lbs. or 30 lbs. respectively, 267° F. or 274° F. This difference in the latent heat enables us to use the steam twice over, first in a high-pressure cylinder where there is no attempt at condensation or the production of a vacuum; and, secondly, in the ordinary condensing cylinder in which such means of producing a greater effect have always been used. But there is an invention in progress to which my notice has recently been drawn, and which I believe likely to succeed admirably well, which will relieve us from the

necessity of having any boiler at all, though we must still have a furnace and fuel. As matters are at present, I should in vain solicit any due attention to this fact, *and this ought not so to be.* I have said that according to actual facts patent to everyone, our ships that now are being built, or that have been built for the past two years, ought to be running on just half the fuel they at present use or contemplate the use of. I now propose to show you that I have myself proved more than a year ago that they might be run with one half of that again, so that the expenditure above referred to of 75 tons per day for 800 nominal horse-power would be reduced by the first improvement in one of the "true economies" to 35 tons per day, and by the second to 17·5 tons per day. In other words, if at present such a power could be exerted for three days, the the first improvement would make it six days, and the second 12 days. On the table of experiments with liquid fuel which I show (see Appendix) you will see that each pound of fuel was made to evaporate 17 lbs. of water instead of eight, which could be done with other fuel (solid) in the same boiler, and that considerably more water was evaporated in the same time and with the same heating surface, and this with an ordinary boiler, perfectly capable of burning coal, as usual, if required, and having added to it no expensive or cumbrous apparatus. Therefore, wise and cautious experiment, steadily continued, might long ago have given us this, which I put forward as one great and true economy of our naval power.

The next part of my subject will be the consideration of wind-power, which there is a strong tendency to ignore, or to undervalue by those who, being only engineers, prefer to rely entirely on fuel for their motive power.

And here I will remark that it is absolutely certain that wind-power can be efficiently utilised even where sufficiently powerful considerations exist to prevent the use of ordinary masts and sails. I have seen models propelled in the wind's eye by wind power, strange as the assertion may seem to those who do not consider that the propeller may be acting under different laws, and be in a different condition from that which they suppose two miles per hour dead to windward is more than most vessels with full sail power can accomplish by beating, and this could easily be done by the application of a fraction of the wind power to a propeller acting on the water, or to a self-contained power like the turbine or hydraulic propeller. I say self-contained, for the hydraulic propeller differs in this from all other modes of propulsion, that it has no other limit than the horse-power of the engine that drives it, to the speed attainable by its use. The paddle, or the screw, after attaining a certain velocity, will churn the water, but will fail to drive the ship; the hydraulic propeller will give useful effect in increased speed for every lb. of fuel you can burn, for every additional horse-power that you can generate.

So far as I know this fact has never even been noticed hitherto by the inventors or advocates of the "Waterwitch," and it ought to be strictly investigated.

But to return to wind-power, however applied, there is first the great

economy during peace to be considered that results from its use, there is, secondly, the fact that engines may break down, that boilers may burst, that your coaling port or fuel depôt may be blockaded just when you have used the last few tons in reaching it, and, lastly, that it has not yet been shown, either at Lissa, or anywhere else, that the masts of vessels were really a cause of serious impediment either under steam or in action, while it is indubitable that in many cases the irregular movements of a vessel are beneficially modified by the presence of masts and sails, and most injuriously affected by their absence. At the same time I have no doubt that all idea of beating to windward would be wisely given up, that a great simplification of masts and rigging would be possible when this view is entertained, and that true economy in this instance will be found to consist in using wind-power to go to leeward, and steam-power for action or to go to windward.

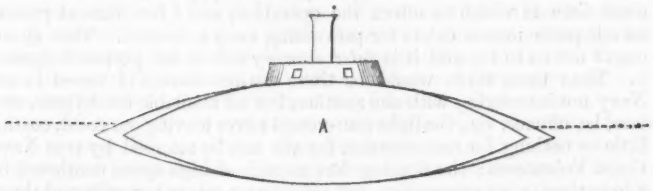
Having thus treated briefly of the forces which are to drive our ships, I will next take the forms of ship which ought to be driven; and here I must observe that though no rule can possibly be laid down which will enable one type of ship to satisfy all our requirements for defence and offence, it is most possible to avoid such a stigma as that not unjustly applied by a high naval authority in the House of Lords lately to our modern ships, "that they are neither fit to "defend our shores, nor to cruise at sea." It is not only possible to avoid it, but there is no excuse for even the semblance of such a state of things. Let us see how far the charge may be a just one. It can hardly be said that a ship is fit to cruise at sea which may be upset by such accidents as a white squall, a summer gale, or even a real hurricane, coinciding with a disturbed ocean level, all or any of which may come with no sufficient warning to allow their avoidance. Neither is that vessel fit to cruise at sea which carries only three to four days full steaming power, and yet is unable to rely on her sails alone for either tacking or wearing with any reasonable certainty, or on any reasonable distance; neither, again, is that a sea-going cruiser which can turn bottom up if a wave of 20° inclination coincides with a heel due to sail pressure of 10° or 15°.

It has actually been attempted, by those who never saw a ship except in harbour, to allege that our seamen are likely to handle such ships as are now given them, *improperly*, which being translated means, that they will not be able to keep an engineer's box from taking its position of equilibrium bottom up. It is unfortunately an undeniable fact that if the "curve of stability" be calculated for any of our modern ironclads, it would point to the certainty of their turning right over directly a given angle of inclination, far short of that which is known to seamen as "on the beam-ends," is reached. In some classes of our modern ironclads, nothing but putting extra weight in their bottoms, which has no value except for this purpose, will keep them from turning over in the most ordinary circumstances.

This is not scientific ship building. What England requires from those who call themselves scientific naval architects is not "curves of stability" shewing when and where her seamen will be drowned, but ships of stability, which, as long as the water is kept out of them, will

never do any such thing. This used to be the case once, and ought to be the case now.

Lord Hardwicke was right in saying that "these ships are not fit to cruise at sea." Are they better fitted to defend our shores? This is easily settled. First, their draught of water is such as to make them specially unfit for North Sea work, where the principal defence would have to be accumulated; and, secondly, their small number, relatively to cost, and, therefore, small number of guns carried, notwithstanding the size of these guns, make it certain that they are ill adapted for this work also. It is only further necessary to say, that science has long ago shown how in small light draught vessels, carrying the very heaviest guns, it is possible to defend our shores efficiently; how with floating forts to dispense with endless fortification, not of strong places, but of weak points; and how for sea cruising, the only real requisites are safety, speed, and power of sustaining it. If we choose to have mailed giants carrying monster guns in order to be prepared for fleet actions, well and good; but they must never be substituted for, or confounded with, either the protectors of our commerce and honour during peace, or the small active defenders of our coast during war, though they may be floating forts and fit for fleet action under steam. If the power given by Captain Moncrieff's inventions be properly utilized, but little armour will be required in sea-going ships, and that little will protect both the vitality of the ship and the offensive weapons she may carry, and yet it will not affect her stability. Turrets, except for smooth-water work and on raft-like vessels, were always a delusion, since they never have given, and never can give all-round fire, their chief claim to excellence, and now, that on the gun has been conferred the power of lowering itself behind the side armour to be recharged, there is still less reason for their use. No naval architect ought ever to have called that a sea-going cruiser in which it was proposed to carry 800 tons of dead weight on and about the upper deck, unless a form of vessel were taken giving enormous beam, like those proposed here by the late Mr. Elder, and



which, for fleet work or floating forts such as I have spoken of, would be far more formidable than any ships now afloat. On this head I think the true economy will be to have distinct classes of vessels for the distinct purposes to be subserved, and to engage in experiment forthwith with this view. The "Staunch" and her consorts may be accepted as an instalment of what should be done—but far more efficiently done, for our coast defence; but the hybrid heavy draught breastwork "Monitor" will have no proper place. Secret telegraphic

communication, available to the coast guard by night as well as by day, which our present telegraphs are not, would place a mosquito fleet, in the shortest possible time, on any part of the coast they were called on to defend, formidable to the very largest ships of the enemy by reason of their number and small size, almost indestructible by his fire, and by their light draught of water, safe from his near approach. Thus, too, the fullest use could be made of the seamen at the various mercantile ports in case of necessity. They could be easily trained during peace, and would be always at hand during war. Such gun-vessels may be fast, and will certainly be handy. As many as twenty could certainly be built for the price of one breastwork monitor, and they would each carry one gun, as big as any on board of her. I had rather attack two such monitors than half of such a fleet, for the ram or the torpedo may dispose of the monitors at a blow; but how can any one deal with the stings of such wasps as he would have in the gun-vessels, for gun-vessels and not cruisers these ought to be, each carrying, if possible, a 25-ton gun, or if not that, as large a one as could be fought and carried? These vessels should never be taken away from their district, but should occasionally be assembled for combined manœuvring. They should be in charge of local naval Officers, and be manned by local seamen. A threatened descent might thus be seriously impeded, if not driven off in the time that would otherwise be consumed in calling larger vessels from a distance, for such a descent will never be attempted near a large fortified arsenal, but at undefended portions of the coast. I know it is said that to land troops in the Crimea and elsewhere, has taken much time, and has proved difficult. I do not believe that this will be the case when an intelligent selection of a deep-water shore for disembarkation allows intelligent and energetic seamen to run the nose of each steamer on to the portion of beach allotted to the troops they carry. I do believe that any nation possessing emigrant steam lines, can land from each of such vessels from 1,000 to 2,000 infantry with ease, or an equal proportion of artillery, cavalry, and stores. I do believe that a few hours of a foggy night would be sufficient time in which to effect the operation, and I fear that at present no adequate means exists for preventing such a descent. This, again, ought not so to be, and it is *false economy* not to be prepared against it. Thus then, there would be three distinct classes of vessel in our Navy not interfering with one another, but all available for defence, or if need be, offence, viz., the light gun-vessel never leaving our coast, costing little or nothing for maintenance, for she can be manned by true Naval Coast Volunteers; the floating fort capable of high speed continued for a long time on an emergency, yet needing no masts nor sails, and therefore no sailors, unless as chiefs or navigators—nothing but artillerymen and engineers (I speak of the vessels proposed by the late Mr. Elder); and lastly the ocean-navy proper, fast, commodious, lightly armoured, yet heavily armed, cheap during peace and formidable to the enemies' cruisers or commerce during war, frigates of the future, with full and properly disposed sail-power and condensed fuel for use on occasion, so consumed that not a pound of useless weight is carried, with armour sufficient to protect the men at their quarters, but not devoted to pro-

tecting the whole ship above water. If the hydraulic propeller be used no injury under water likely to occur from shot, would be fatal. But all this will require experiment, and *experiment* is the only means of reaching *true economy*. A few strokes of the pen may reduce expenditure, but there must be much labour of the brain, and hand too, before true, lasting, economies can be realised.

I will now advert to those economies, real and false, which affect the *personnel* of our naval power. First, as to the seamen, for to paraphrase Goldsmith—

> "Chiefs and their staffs may perish or may fade;
> A breath may make them, as a breath has made;
> But the bold mariners, their country's pride,
> When once destroyed can never be supplied."

That is, in time to be useful. There is little use in ignoring the fact that the modern requirements of our men-of-war seamen, involving constant drill and discipline, even more than a sailor's knowledge of the handling of wind power, have gone far to separate the naval service from the commercial marine of England, and it is here the false economy not to keep up a large force of really trained men-of-war's men, providing at the same time by the admirable proposals brought forward here a few days since for substantial reward in continued employment on shore for those who had well served their country at sea, and also providing, as might easily be done, that during peace sufficient profitable employment should be found for those who might be waiting to take their turn at sea. Economically conducted Government manufactories of such articles for naval service as only government requires, might amply fulfil this condition of preparedness for all those eventualities which come *so suddenly* upon us in these times, and a great deal of the modern man-of-war's-man's drill could be done on shore far better than at sea.

Continue therefore and multiply those training ships for boys which are already doing better work than many educational boards, for these supply a real demand, not an ideal one; these make honest handworkers, not dissatisfied brain idlers. Teach them that they are prized by the State they serve, and shall be liberally, not grudgingly rewarded. Teach them that good conduct will raise them in real and permanent position, according to their real capabilities, not in false imitations of tinsel rank. Responsibility is often a real terror to those who know themselves well fitted to obey, but also know that the accidents of birth have never fitted them to command. It is not true that any education, still less such education as can be given after the child passes into the world of schoolboys, will ever enable all men to be equal in capacity for taking the place of governors rather than of governed among the human race.

Instances of self-raised men are not indeed rare, but they prove the force of genius and character, not the power of education, and here I take occasion to say that, whether for Officers or men, a seaman's best education, as that indeed of all other professional men, consists in teaching him to do as well as he possibly can that which his future life probably will require him to continue doing, not any attempt at a smattering

of all knowledge, in many branches of which he can never succeed in being anything more than a bungler.

I now turn to the *personnel* of Officers, in which England has in former times been so rich. As engineers—for the first who embanked the Thames in modern days was a naval Officer—and many there are now in our Navy who have shown a skill under circumstances of exceptional difficulty, of which civil engineers might well be proud, for fertility in expedients is a well known quality of naval Officers; as diplomatists of firmness who never meddled or muddled; yes, even as directors of great commercial enterprises in times of peace, I am proud to assert that no profession has ever shown more readiness of hand, brain, and heart, than the Navy of Great Britain. But if by an unwise economy the position of such a professional man should be rendered to the last degree uncertain, if, in addition to ignoring merit, it should be attempted to over-ride professional claims, then it seems certain that no such results can in the future be obtained as have so largely contributed to the state of England's naval power in the past.

We may acknowledge the difficulties of ever-increasing-half-pay lists and obsolete professional knowledge, but these may be more reasonably attacked by a true union between the junior Officers of the Navy and mercantile marine than by ill-treating old servants; this indeed would be a true economy, and nothing could more contribute than such a course to root in the hearts of the nation, the most wholesome of feelings an Englishman can have—a true love and veneration for England's naval power.

The CHAIRMAN: The present paper has touched upon these subjects:—

Fuel.
Sail power properly applied.
Motive power.
Forms of ships, and the utilization of separate forms of ships to separate purposes.
Economy of *personnel*.

If any gentleman is inclined to speak on the subject, and will confine himself to these heads which I have just read, it will be treating the subject clearly, and will take up less time. The first subject is fuel. If any gentleman is inclined to speak upon that point, we shall be glad to hear him.

Mr. BELL GALLOWAY: It is a lamentable fact that the ships in Her Majesty's service at the present time are using an estimated quantity equal to 4½ lbs. per indicated horse power. It has also been stated that in a vessel called the "Briton," it has been practically proved, that 2 lbs. per indicated horse-power is all that is requisite to accomplish the object of power. The question then comes, why should it be that 4½ lbs. should be paid for by the Government of this country, when 2 lbs. is quite ample for the purpose? The next question is this, is our form of propeller best adapted to utilise the fuel required for the production of power? Captain Selwyn has pointed out that with the hydraulic propeller in proportion to the power applied, you can have a better result than from the screw or from the paddle. If that be so, why then is not that used as the correct form of propeller? My last remark will be this, that I hold equally with Captain Selwyn, and I believe it will be admitted upon equitable principles by every one present, that if encouragement were given to those who devote their time, give up their energies, and use their means for the development of science, the country would save a large amount, science would be promoted, practical results would be obtained, and so much fault-finding,

so much grumbling, and so many anomalies would not exist, and we should be all the more benefited by it.

Captain COLOMB, R.N.: I should like Captain Selwyn in his answer to state what he calls "properly-applied sail power." As to motive power; I only wish to say—in a measure to back up what Captain Selwyn has said about the hydraulic propeller—that I do not think that the service is quite aware that the "water propeller" has never been properly tried; it has always been tried under conditions where other elements have interfered with its value, *per se*. We don't know at this present moment—nobody in England can say for certain—whether the "water propeller" is an economical or an uneconomical power for propelling a man-of-war.

Mr. ANDREW MURRAY, C.B.: Having had much to do with the experiments with the hydraulic propeller to the extent to which they were carried out by the Admiralty, I am glad of an opportunity of backing up what Captain Selwyn said with respect to it in combination with sail power. I look upon the results that may yet be obtained from it in that respect as probably superior to any that have been obtained from any other steam propeller in combination with wind. With the hydraulic propeller the water is taken into the ship as she proceeds, and immediately acquires the velocity of the ship, and is carried with it, and it is then acted on by the centrifugal pump in the interior, and driven out at a velocity in accordance with the speed of the engine. The velocity with which the water is driven out, and from which the power of propulsion is obtained, is always in accordance with the speed of the engine, and it appears to me that nothing is lost in the action of this propeller by the speed with which the vessel may be going under canvas at the time when it is set to work to act in combination with the sails. That is not the case either with the screw propeller or with the paddle wheel.

Captain SELWYN: May I draw the speaker's attention to the fact that I introduce a perfectly new consideration on the point. It is that the hydraulic propeller is a self-contained power, like that of the rocket, and that the more power you put into the ship the more will be the effect on the ship, whereas that never can be the case with any propeller which depends on its area of push for its power over the vessel.

Mr. MURRAY: I was speaking about the propeller, simply, when called upon to act in combination with wind sail power; that, if a vessel is already going ten knots under canvas, if you put on steam power with either screw or paddle-wheel the advantage gained is slight. I hold that with the hydraulic propeller, supposing that the ship is already going ten knots, she will get the whole advantage of that power, the same as if starting and proceeding with that alone. I have advocated that view for a long time. I am sorry that the circumstances have been such connected with the "Waterwitch," as to have prevented the Admiralty considering it right to continue the experiments. More experiments are particularly wanted. We know nothing of the subject, we neither know whether to send out the water through a small orifice with a high velocity, or through a large orifice with a slower velocity. We know nothing of the form of the pump. I disagree entirely with the form of pump in the "Waterwitch," but that is in the hands of the patentee—not in the hands of the Admiralty. Intending to speak upon this, I thought I ought to speak upon all the points in the paper at the same time. It is new to me to divide the points in this way, otherwise I would have made a few remarks upon the economy of the fuel. But, perhaps, it will be more in order that I should do that afterwards. (Go on.) I should only say that Captain Selwyn spoke of the compound engine in the "Briton." I would call to his memory that that is not the first compound engine that has been used in the Navy.

Captain SELWYN: I said it has long been known in the mercantile marine.

Mr. MURRAY: But that is not the first engine tried in the Navy. There were three vessels, many years ago, tried competitively. Two other vessels, the "Serapis" and the "Crocodile," were fitted with compound engines by the late Mr. Humphreys. There were some points in which some difficulties accrued in their working, and to my great regret an order was given by the Admiralty, and a backward step was taken, to restore the engines to single acting cylinders. As a passing remark, Captain Selwyn will forgive me, he said that the constant temperature of 100° meant nothing.

Captain SELWYN: It means nothing as regards the evaporation of water.

Mr. MURRAY: Let me explain what we understand by it. I think the audience will easily understand that if we take a quantity of water at 33°, the coldest water you like, or take it at 60°, and put it to boil on the fire at that temperature, it will require a little more fuel than if you put it on at 100°. That is the reason why we take 100°, because the water put into the steam-engine boiler sometimes comes from the condensers, and it is slightly warm, sometimes 80°, sometimes 90°, sometimes 100°, and we allow for those few degrees.

Captain SELWYN: It does not give the unit of heat.

Mr. MURRAY: It simply gives what I state, that you will evaporate more water if you put it on the fire at 100° than if you put it on at 60°, because it does not require the fuel to raise it from 60° to 100°.

Captain SELWYN: If you take from a temperature of 212°, it does not give you a more accurate measurement of the unit of heat and its work done, as if you had so taken it, as Professor Rankine does, from 212°.

Mr. MURRAY: You can always bring it up to 212°. We take the water as put into the boiler, whatever that may be, 40° or 80°, and bring it up to the 100° as a standard.

Captain SCOTT, R.N.: Will you allow me to make one remark about the hydraulic propeller (I have not spoken upon the subject before), that it has always appeared to me to be a most important means of propulsion. At present we cannot turn our long vessels, but Admiral Inglefield, who is now engaged in working out the application of the hydraulic to turn the propeller, is also paying considerable attention to the subject of applying the hydraulic to turning the vessel herself. When the hydraulic propeller, as a means of propulsion, is combined with the means of turning the ship, you will, I think, have every advantage that can possibly result from its use. I cannot but concur in what has been said as to the inconclusive character of the experiments that have hitherto taken place. As a first experiment on a large scale, the results obtained in the "Waterwitch" are very remarkable. Many of our vessels with their exposed rudders are very liable to damage. Their engines also are much exposed. If we can by means of the hydraulic propeller get not only a means of propulsion, but also an auxiliary means of turning those ships, even if your main engines break down, you will be still enabled to bring your broadside guns to bear by turning the vessel. I look upon the hydraulic as one of the most important means of propulsion that has been devised, but think it is still valuable as a turning power.

Captain SELWYN: I hope engineers will not be deterred from speaking after considering the extraordinary result (see Appendix to paper), shown on that table, because I may say that there has been no continuous evaporation of water ever obtained in any country from that common type of boiler, anything equal to what is shown there. That is the first time that it has been done. It has been done as experiments on a small scale. I accurately checked them, and various other conditions. For nine months that boiler was going on making steam.

Captain HANSON, 1st Surrey Rifle Volunteers: I am a Volunteer, but I have taken great interest in naval matters also. I should, therefore, like to put one single question. Can such a vessel as is shown in the diagram which Captain Selwyn has drawn, and which seems to me very much to resemble a form of vessel which was lectured upon here some time ago—a saucer-shaped vessel—sail? The diagram only gives the midship section of that vessel.

Captain SELWYN: That vessel can proceed under sail with the utmost facility. The longitudinal section may be prolonged into any form of the ovoid you choose to adopt, or it may be the complete segment of the sphere.

Mr. HANSON: I answer you directly, in order that no argument may proceed on a false basis. This is by Mr. Elder not put forward as the only shape in which you may put a ship, but as being the segment of a sphere, or a body approaching to a sphere, the greatest containing body with the smallest perimeter, with the least draft and the greatest speed.

Mr. HYDE: Perhaps you will permit me to remark that the paper which the gentleman just now enquired about, was read by me some two years since in the

theatre of this Institution. It was a paper on ships with deflecting sides. Subsequently, the late Mr. Elder read a paper on circular ships. The diagram which Captain Selwyn has drawn represents simply a cut or section through the middle of that circular ship. The vessel that I proposed, and which I have advocated for some 18 years, has the same section, but is not circular, but an elipse, an elongated oval, still having deflecting sides. The object of having deflecting sides in preference to vertical is simply this, that all artillerymen, all constructors of guns, naval Officers, and those who know anything about modern artillery, agree that vertically-sided ships cannot keep out the projectiles of these modern days. We have just constructed a gun known as the 35-ton gun, which is said to be able to throw a shot through a 12-inch plate at a distance of 2,000 yards. If that be so, and we have no doubt it is, what class of ship can you build which will be capable of keeping out these direful projectiles of modern days? Perhaps Sir George Sartorius will remember that I had the honour of some conversation with him upon this subject two years ago. The drawings, diagrams, and models were left in this Institution for some days after the evening of the paper, so that any gentleman might see how simple and how convenient a ship could be built having sides at an angle of some 22½° or 30° to the line of fire. It is well known that experiments at Shoeburyness and other places show, and even in actual warfare we know, that if a shot hits unfairly a surface, that shot passes off and ricochets. Now, why cannot that principle be employed in the construction of our ships? It can. There is not the slightest difficulty about it. If the ship's sides are presented to the line of fire at a sufficiently low angle, there is no projectile that can be thrown from a gun that will pass through them. This is now what most naval powers are seeking to obtain. I can tell you that the Prussians at this moment, in their arsenal at Kiel, are making experiments, and are, in fact, constructing vessels of this class. That is a fact which ought to be known to the authorities of this country. It is perfectly plain that in all personal encounters you attempt to parry a blow instead of receiving it. The art of fighting in defence is to parry a blow. Why not then investigate a system which presents to us at least a common-sense plan of keeping these direful shots out of our ships? If you will allow me a moment, I will make a midship section to show exactly the form of vessel that I allude to. (Drawing the same on black board). The plan of the ship would be an elongated elipse or oval, with sides at an angle of 22° to 30°, and the turrets, if such a vessel had turrets, would be placed one at each end. Now, the armour with which these ships would be protected need not be so thick and so heavy as the armour used in our present ships. I know the argument has been used, that the long surfaces in the deflecting sides added together would make a heavier armour than if placed vertically; but the reply to that is this, if you place it vertically, shot will go through it; if you keep it at a low angle, the shot will pass off by ricochet. All sailors, all artillery Officers, who have seen the models—and I shall always be pleased to show them—tell me that this is the form of ship which is most likely to keep out the shot of our modern guns. It is obvious, if the Prussians are giving attention to it, and if naval Officers generally and artillerymen are giving attention to it, that it has some advantages. I have no doubt that these immense guns which are now being manufactured, will of necessity compel such a system as this to be introduced in the construction of some of our future ships.

The CHAIRMAN: We now come to the utilization of separate forms of ships to separate purposes.

Captain SELWYN: What is meant by separate forms for separate purposes is that to which I adverted to, namely, the three classes of vessels, one constructed solely for shore defence, in which will be the best utilisation of our coast volunteers; the second also for harbour defence during an inchoate phase of war when the requirements are not fully defined for fleets, and then they are useful as floating forts afterwards; these would come in for even fleet actions near home; and the third, ocean cruizers. The "Staunch" and her consorts are existing examples of the first class.

Captain MONCRIEFF: In reference to this part of the subject, the smallest gunboats which have been used in the Navy, namely, the "Staunch" class, have the advan-

tage of economy, when looking at the price per gun in these vessels in comparison with the price in larger vessels. I have before me a statement relating to several classes of vessels. The "Staunch" gunboat, mounting a 12-ton gun, is put down at £6,000 per gun: the "Inconstant," unarmoured frigate, at £13,000 per gun; the "Caledonia," with 4½ inch light plating, mounting eight 6-ton guns, six 10-pounders, and twelve 68-pounders, £11,500 per gun; and the "Royal Sovereign," turret ship, with 5½ inch plating, mounting five 12-ton guns, £40,000 per gun. In the heavier armoured ships the expense per gun increases very much. The "Sultan," with plating from 9 inches to 6 inches, and 12-ton guns, costs £31,000 per gun; the "Devastation," a turret ship, with plating from 12 inches to 10 inches, with four 12-ton guns, £69,000 per gun; the "Glatton," turret ship, from 12 inches to 10 inches, and with two 12-ton guns, costs £84,000 per gun. It is therefore evident that if these small vessels are well suited for a special service, it will be more economical to employ them for that purpose than the more expensive kind of ships.

Captain SCOTT: I think Captain Moncrief has made a slight mistake as to the guns. The "Devastation" guns are 35-ton guns, and one of the 35-ton guns is at least equal to a dozen of the smaller guns he has named. The "Glatton's" are 25-ton guns, and the "Inconstant's" are 12-ton guns.

Captain MONCRIEFF: I beg your pardon; I have made a mistake.

Captain SCOTT: Of course it was merely a mistake. You must remember that efficiency depends upon what service you want the vessel for. The "Inconstant" is a vessel that you can send all round the world. She is a fast cruizer under sail, and can carry heavy guns and a great number of men wherever wanted. Nobody can say that the "Staunch" can do such duty as that; she is merely a coaster. As regards the *value* of the "Staunch" class, there I perfectly agree with Captain Moncrieff. There is no doubt that these vessels are of very high value for protecting our harbours and coasts, but I do not think you can compare them with vessels that are not only good for home service but good for foreign service, and good for any other service.

Captain SELWYN: May I recall Captain Scott to the subject of the paper, which is, special vessels for special services.

Captain SCOTT: Allow me to say that I am perfectly in order. I am speaking of special vessels for special services, and will now say that I think the "Staunch" is rather too small for her intended service. We want a vessel of similar type, but capable of carrying the heaviest gun, viz., a 25-ton or 35-ton gun; she must therefore be somewhat larger than that vessel is. Not only should she be able to protect our own shores, but she should be also able, if it were requisite, to carry her guns across to the neighbouring shores. I think the power of England depends upon offensive power much more than upon defensive. To come to the next class of vessel. You want fast unarmoured cruizers with the highest speed, and the other qualities that Captain Selwyn has stated. As to line-of-battle ships, you want very powerful vessels that will stand a great deal of hammering. We have now got such vessels. Whether powerful vessels will be required hereafter more than lighter vessels is well worthy of consideration. Still, our heavy ironclads are exceedingly powerful vessels, and they will enable us to hold the empire of the sea, whilst with fast unarmoured cruizers of similar type to some we have built and are still building, we could chase any other vessels off the sea. Our "Staunches" and proper coast defences would then make our island perfectly secure (so that we might sit down at rest and feel contented with the assurance that we had not gone far out of the way in the line we had taken). I do not think we have yet got so far as this, for we want a great many more fast unarmoured cruizers, and we want more vessels of the "Monitor" type, and a great many more "Staunches." Instead of a few of such vessels having been ordered to be built, we ought to have already built a hundred. Then, with regard to what has been said of experiments, we are entirely deficient of definite experiments. The cost of most of the gunnery experiments that have been made, I look upon as money thrown away. We really do not yet know what the actual power of our guns is, although we have gone on piling up armour on the sides of our vessels (in my opinion we put on a great deal too much) without knowing what armour we

really require. We have been firing at Shoeburyness upon plates fastened in a particular way, and supported in a manner that they are never supported when placed on a ship, and we are now going into further experiments of similar character which will therefore be equally futile, for they cannot yield any practical results. Without making too long a story, I wish to say that our false economy in making cheap and incomplete experiments is one of the most dangerous things at the present time. This is an age of progress, and unless we carry out complete experiments on a comparatively small scale, we shall be hereafter trying in war experiments on a large scale, which may prove almost fatal to our supremacy.

The CHAIRMAN: The next subject is the economy of the *personnel*.

Captain SELWYN: By that I mean the Officers and the manning of our ships.

Commander BRENT, R.N.: I cordially agree with Captain Selwyn, that our men should be well trained. It is a subject of great importance to all naval men, to the Navy, and to the country in general. That part of Captain Selwyn's paper might almost form a paper on "internal organization of the Navy." Of late years, during a ship's commission, we have been trying to teach our men almost too much. Captain Selwyn said they should come on board perfectly trained. I quite agree with him, and if we run over what we have to teach the men during a commission, at the end it is found they are not perfectly taught, except, of course, the few men who come from our gunnery establishments. As he said, we shall have vessels with guns, therefore we want good seamen gunners. We also want our men to be good sailors, able to do their work in all parts of the ship, and under all circumstances. They must also be fair soldiers, able to do their work in a company and in a battalion, and also work field guns. They must be fair swordsmen, and to acquire a thorough knowledge in each one of these points, takes almost a lifetime. The men should come on board ship perfectly instructed in these points, and then we should have to teach them seamanship. I think a part of the year should be set aside in which every ship in the service should turn herself into a gunnery ship for a time, and run through the gunnery and the military duties that seamen have to learn now-a-days. It is of great importance that we should not have perpetual instruction going on while the ships are in commission. Seamen gunners come on board, and we have no trouble with them, but no Gunnery Lieutenant is satisfied with his work at the end of the commission; he has quite broken down, and if you ask him, he will tell you he has taught the men in a certain way, but he is not satisfied with the result. A man-of war's man has much to learn, and he should come on board ship knowing his gunnery work. I think we ought to have larger gunnery establishments, in order to teach the men, so that you should start on your commission with every man on board, except the boys, perfectly instructed, then you would merely have to keep up that knowledge and teach them to be sailors.

Commander PUSEY, R.N.: I should like to ask the last speaker a question with regard to what has been said about gunnery establishments; is it not a fact that after seamen have been well trained, and have been a long time on board in a sea-going man-of-war, and have passed out of their drills, they are still kept on, day after day, in musketry drill, cutlass drill, and gun drill, and whether it is not that which disgusts seamen so much with the idea of gunnery?

Commander BRENT: I do not think the seamen are disgusted with the gunnery, because you find all the best men go to the gunnery establishment, but what is done is that they are never perfectly taught in sea-going ships, they only get a smattering. I know that no gunnery Officer is satisfied with his work at the end of the commission. The drills get so broken into by the ordinary work of a man-of-war that nothing is perfectly done, and as Captain Selwyn has said, we want the men to be well trained and well taught before they go to sea.

Captain COLOMB, R.N.: I understand Captain Selwyn to say that he thought the times were such, that the Navy less and less approximates to the merchant service, and I understand him that we must depend more and more upon the Royal Navy, and less and less upon any help we might get from the merchant service. I think that is only true to a certain extent. If we, as Naval Officers, were at the head of the government of the country, I have no doubt whatever that we should be able to depend entirely upon our own men, but the government of the country is such that

political exigencies will perpetually necessitate the pricking of the Navy as you prick an india-rubber ball, and permitting it to collapse for given periods of time. I think the only way to puff this ball up again in time of danger is to keep, as we are now keeping, a totally separate Reserve in the merchant service, that we can call upon when we want them. It is a body of men not likely to be touched. It escapes in the estimates, it does not cost much, and when politicians take a pull at the Navy, they are unlikely to take a pull at the Naval Reserve from the merchant service. Consequently, we always have that body of men to fall back upon in times of panic, which inevitably follow a time of great economy.

Mr. AUSTEN, C.E.: I wish to speak upon the subject of fuel. I have only to state that I have devoted eighteen years of sharp practical investigation into the use of peat as a fuel. That coal is derived from peat is positively certain, but it is the work of 6,000, 7,000, or 8,000 years before it is sufficiently condensed to form coal; but by mechanical application you can drive the air and water out of peat. It is a fact that our British peats have at least 75 per cent. of water in them, which wants driving out, and how to drive it out has been the problem. I have had the good fortune to succeed in doing it. What was wanted was not compression, but condensation,—how to drive out the air and water, and then present the peat in a mass that would be applicable for the furnace. I have seen experiments tried in Ireland. They make the peat into the form of a disc by driving it through a cylinder and cutting it off about three-quarters of an inch in thickness. These were thrown into the furnace, and it was found that they had to be pulled out again to be broken up with what is called the clink hammer. It struck me the best thing was to form a ball. Parties have said to me, "Why don't you cut it into squares or cubes?" My reply is, that if you cut it into squares—every man who has been on board ship knows that if you have to stow a large bulk of artificial fuel in the shape of squares or cubes, you must send in a man to crawl on his hands and knees to stow it in its place, and send him in again to pull it out; whereas in the shape of a ball the peat will roll itself out when it is wanted. Then I found it was impossible with any machinery we have, to produce a square or a cube so condensed as the ball in my hand. I then produced this article in the shape of condensed peat fuel. It is 50 per cent. heavier than coal, and I give you my word, for it is not a mere asseveration, that one ton of this will do nearly three times as much as the best hand-picked coal that was ever dug from the mine. This has been proved by experiment, and it only wants to be proved on a large scale by access to powerful machinery sufficient to make 50 tons a day. I do not make these assertions as mere asseverations, because they have cost me years of reflection. Had I been a man of wealth, and could have put my hand on a few thousand pounds for machinery, I should not have to ask assistance, or to ask the co-operation of any man living. I would have gone on and spent my last farthing to prove it. But I have been prevented bringing it forward for want of means. I have now orders from the Peninsula and Oriental Company, from the West India Mail Packet Company, from the Admiralty, from the dockyards, from the Underground Railway, from Hong Kong merchants, and last, but not least, from Russia. The Russians have offered to take all the material I can make for St. Petersburg and Moscow. Unfortunately I have not the means of making it. I am proud of my country in every other respect, but it is an unhappy country for a man who is born with a genius or brains; he is treated like a mad dog instead of being treated as a first-class man, as he would be in America. I appeal to any American present, whether, if I had produced such an article as this in Boston, I should have passed a fortnight without having a number of friends around to take it up, but in this country I must starve, or go into the workhouse. The object I have now is the introduction of peat as fuel, so that the Secretary of the Navy should be able to send a ship of war out to sea with three times the quantity of fuel that she can carry at present. If that is not an advantage to Her Majesty's Navy I do not know what is.

Mr. C. F. T. YOUNG, C.E.: The paper read by Captain Selwyn touches on the economy of fleets, both in form and maintenance, construction, and so forth. I should like to make a few remarks. First, I am glad to hear that these experiments with liquid fuel have been carried on for so long a period as nine months. I have

seen a great deal of the fuel myself, and it is perfectly safe and perfectly efficient. It has this great advantage, that it does not deposit a non-conducting material on the heating surface like coal, therefore you get a greater effect from the heating surface. In regard to the economy of our ships, the other day I was going over the figures of our earlier ships, such as the "Achilles" and the "Warrior," and contrasting them with the results of our later ships, the "Hercules," for example. The engineer's question is this. Here is a weight of a given amount, moved in a given time at a given velocity, at an expenditure of a given amount of power; and the generation of that power necessitates the expenditure of a certain amount of fuel. I find, taking the "Hercules," and comparing her with the "Achilles," she gives 40 per cent. retrograde economy, that is to say, costs 40 per cent. more in the way of fuel to move that ship (I am speaking of the "Hercules with all the modern improvements) at the same velocity as the "Achilles" some eight or ten years ago with the old engines. I have Mr. Reed's book, and he states that the new engines with all the latest improvements go to 3 lb. or 3½ lb. per indicated horse-power, and the old ones go to 4 lb. and 4½ lb. I take the extreme in both cases, that is to say, taking a given amount of work over four years for both ships, that the "Hercules" would use 11,000 tons more fuel to do the same amount of work, moving at the same rate than what the "Achilles" would do. I do not find that we have got an economy by these very short stumpy ships. I do not say that we must have ships so long as the longer ones; still I am satisfied that these very short ships are neither economical in the first cost, nor are they economical in the results obtained by burning a given amount of fuel.

Captain SELWYN: Captain Colomb has asked what I meant by "sail-power properly applied." I think if he has time to look over the paper he will see that I laid down an axiom, which as far as I am aware, has not hitherto been noticed. It is that sail-power should never be employd where steam is present, to go to windward. That is a wrong application of sail-power; and inasmuch as with the very best beating, you can only go to windward two miles in one hour, you had better do it with steam direct. There is another point which Captain Colomb did not, perhaps, quite understand. I said that sail-power could be applied without masts and sails. It seems very curious that wind-power could be applied without masts and sails. It is absolutely and perfectly true, however, that although the horizontal windmill only gives out about 33 per cent. of the theoretical power, yet that that power applied to the propeller will do more work than if you applied the full power of the ordinary sails in propelling a vessel to windward by beating. I am speaking now of a case in which, for other reasons, you wished to do away with the existing masts and sails altogether: you can have such wind-power still, as will propel your ship if the engines break down. That is what I call the scientific and true application of sail-power; not relying upon what we have done in other times, under other circumstances, but considering what can be done and what ought to be done for due economy in the present time and under present circumstances. Mr. Hanson asked what will be the length of the vessel I mentioned. That question I pretty nearly answered. The vessel I referred to was proposed by the late Mr. Elder, and I quite recognise the value of his proposal—not at all with regard to any shot-deflecting properties it might possess, which are outside the question; but with regard to the peculiar fact that this is the only shape of vessel that will give you the highest containing power, because it is a segment of the sphere which is the greatest containing body. It is the only vessel which will give you, with great capacity, fine lines to be rapidly driven. It is the only vessel which, with a minimum of armour, can be made to give the maximum of security. It is the only shape of vessel which will bear the weights placed upon it high up, which no deep draught breast-work monitor will do with safety. It is, therefore, worth considering, when we have to talk of a fleet which will manœuvre readily and handily at sea, in columns or lines, as it may be desired, under steam alone, with very liberal limits as to the duration of that steam, if these improvements be adopted,—capable at all times of ramming an enemy, but not of being rammed except by a similar vessel, and then very ineffectually; capable also of being propelled by hydraulic power which will set at nought that newly invented demon, the torpedo. The great value of the hydraulic power is

this: if it were proved that it never could surpass the screw or the paddle, there would still remain the fact that it pumps the vessel out with the full power of the engine exerted, while it is also propelling her; consequently, no shot, no torpedo, even, in a well-constructed vessel, could sink the ship. I quite agree with Captain Colomb that such a water-propeller was very inefficiently and very ignorantly tried; and those who tried her were satisfied to relegate her to the things that were, after having proved that the very first of such propellers was equal to the best screw they had built on the same lines, and with the same dimensions. With regard to Mr. Murray's observation on the compound engines, I beg leave to point out that I did not say at all that compound engines would do everything for a man-of-war at once. But what I did say was this, that it is a scandal to the Navy to see a dozen such as the "National" steamships from Liverpool running to-day, developing 800 horse-power, on less than 2 lb. of coal per indicated horse-power per hour, while only one vessel of the Navy has arrived at that conclusion, which yet has not availed to change the practice of wasting fuel in other ships now building. If people will ignore inventors and will never be contented to take up an improvement until, by passing through all the phases of mismanagement, they at last arrive at the true practice of the invention, instead of asking the inventor to do it for them, then I say it is not wonderful that that which is done by the mercantile steam ships in one year, cannot be done by the Navy under ten years. I recognize the difficulties under which all officials labour. I recognize the tendency in this country to cut down votes for experiments, and to throw difficulties in the way of invention. But I say in my paper, and I repeat here, this ought not so to be. With regard to the calculation of evaporative effect from a certain temperature, I have shown the calculation from 100° F. as well as from 212° F. It is obvious to anybody that as it is not from the changing heat at which water may be pumped into the boiler, but at the constant degree at which water will make steam, the calculation ought to start, and that has been considered by all philosophers, and ought to be considered by our Naval authorities, if they wish to get true comparative results from fuel, I think it is obvious the sooner they change and work from the constant of 212° instead of 100°, at which no steam can be generated at all, the better. With regard to Captain Scott's observations on the hydraulic propeller, I have already stated that it has the advantage of unsinkability. That is a great advantage. It has also the power of doing away with the training of guns, because the ship can be trained with the hydraulic propeller in less time, given a certain shape of ship, than you can train the gun, and will give all round fire as far as it is useful at sea. When you add to that the fact that after all a vessel of 3,000 tons, propelled at the rate of even eight knots an hour, has a superior effect to the biggest shot that was ever fired, you will understand how valuable it is; you have a vessel so propelled that at any moment and in any direction she can be sent with full velocity against an enemy. Those who have passed through a collision in a railway train know how something like 300 tons, which is the fair average weight of a train, going we will say at fifteen miles an hour, will compare with 3,000 tons going eight miles an hour. Is there any doubt that the attacking vessel in ramming must always be the superior. You need not consider whether you have any guns on board, provided you have got a sufficient steam propeller to use in this way. I do observe on this with the more pleasure that I know I am in the presence of an authority who has never failed to advocate that form of offence. Mr. Hyde spoke of the deflecting sides. I must say that there is a certain law connected with deflecting sides. It is this. Given a weight of armour, it does not matter whether you dispose it on an incline or upright; *i.e.*, in the one case less height or surface admits of more thickness, in the other extended surface necessitates less, but deflective power makes up the difference. There is this difficulty, that the moment you get alongside a vessel only slightly elevated above yourself in height, and able to fire down upon you with properly constructed gun carriages, all your fancied security disappears at a blow; and if you get under a high fort like the Wasp battery in the Crimea, you will get stung right through from top to bottom. Deflecting sides do not then come into play. There is another objection to deflecting sides. Deflecting sides are very true, in an engineer's point of view, when you can secure a smooth sea and no heel or roll. But I have not yet found out the time when a ship

is on an even keel at sea. Our Chairman has seen many years' service at sea, and I have no doubt he has equally failed. With regard to the cost of the breastwork monitor compared with the small "Staunch," Captain Scott did not quite recollect that a 4½-inch plating will not keep out anything. Therefore we had better compare it with a ship unarmoured altogether than with one which has got 4½-inches of plating on her side, for not only will she not keep out any shot, but she will contribute to the deadly effect of that shot by the pieces of plating which will be driven in among her crew. The breastwork monitor may carry, I will say, a 35-ton gun. Now, I do not know any reason, I have never yet heard any reason, why a vessel 100 feet long should not carry a 35-ton gun too. If you build her of iron, and build her properly, and do not insist upon having a carriage which transmits a great deal of shock horizontally, which Captain Moncreiff's carriages will never do, you take away that strain which has hitherto prevented us from carrying the weight in a vessel of small size, and you prevent all that dangerous shock which might shake even an iron vessel to pieces. I say that a vessel of 100 feet long and 12 feet beam will easily and properly carry on Captain Moncreiff's carriage even a 35-ton gun for coast defence,—not to go any further than the coast,—to be properly manned with a small crew, such as can be given to a gun-carriage properly made and working itself, properly supplied with shot, not supplied with provisions and sails, which are only necessary for ocean cruizing, but so efficient that she will give us back that percentage of loss which we now have to pay for panics.

A VISITOR: Will you say what depth of hold will be required for Captain Moncrieff's gun-carriage?

Captain SELWYN: I think if you say five feet draught you could easily manage to do that on certain lines.

Captain MONCRIEFF: It would require a little more displacement.

Captain SELWYN: You may give more width. I am not asking for very high speed. The displacement you say must be more.

Captain MONCRIEFF: 16 feet beam.

Captain SELWYN: We will take it at that.

The VISITOR: The gun is to be lowered below the water line.

Captain SELWYN: Not necessarily so. It may be so lowered. It will not do if it is a 35-ton gun, seeing that it is 9 feet in the breech. That is how they are made now. It is to be hoped that they will be made less cumbrous some day. But the cost of the breastwork monitor is compared not with one gun,—I think I understate it,—but with twenty guns in twenty small vessels. I know some gentlemen who will undertake to construct such vessels for very much less than the "Hotspur," that shall carry quite a formidable gun enough to prevent a landing on our shores.

The gunnery question and the necessity for training our seamen comes next. Here I must remark that I did not suppose it was possible to put on board men-of-war, men thoroughly trained to everything they could learn on board a man-of-war. Nor do I think it would be desirable to teach them without that life at sea which is, after all, true training. But they can learn certain things better on shore than at sea. Among those things are the drill of swordsmanship, military drill, shooting with the rifle, and probably a certain amount of the shooting which will be required by the artillery, not that which refers to shooting at moving objects with large artillery. But I propose that this should be done, that the whole of the necessary forces should be kept up for manning our Navy in time of war; that that portion which is not employed during the time of peace should be so trained and so managed as alternately to take its place at sea, and learn that training, too; that while on shore it should not only be drilled and trained, which could be done in these matters that I have spoken of, which would occupy a small portion of their time, but that the remainder of their time should be occupied usefully and economically as producers. Constant drill has been spoken of as disgusting the men. I have no doubt whatever that every man thinks himself perfect as soon as he has got a certain amount of proficiency. But I never saw the man who could, without detriment, pretermit in either arts and arms, the constant practice of those professions, and though the drill may in some cases be carried too far, yet I think it ought to be left to the instructors on the spot, and, then, I have no doubt

whatever that it would be done properly. As long as everything is centralised, and no judgment is permitted to those who are alone capable of judging by reason of their presence on the spot, so long will you have such anomalies as that; with increased expenditure you only get worse results. Captain Colomb compared our Navy to a puffed ball, and I think not unwisely. But you must recollect that if you get men who never having been in the Navy, are utterly untrained to the work of the Navy, and who, by being exercised at a 32 lb. gun on our old carriage, would never learn to work one of Captain Scott's or Captain Moncrieff's guns, I am rather inclined to think that that trust in them would be a puffed ball. I do not like the idea of a Naval Reserve which is to be relied upon in war by those very naval Officers who do not see it during peace. Mr. Austen spoke very largely of peat and its mechanical application. I say distinctly, and I hope Mr. Austen will take it to his heart, because it will save him a great deal of time and a great deal of money, that mechanical appliances for condensing fuel can never compete with nature where she supplies the article already condensed, or where that condensed fuel is to be had as the refuse of a paying chemical process for other purposes. More than that, peat can only be made up of carbon, with a very small and inefficient proportion of hydrogen and some oxygen. The purest carbon known is the diamond, and that diamond, if carried into its most perfect combustion, can only evaporate 15 lb. of water per pound of diamond. Mr. Austen can never hope to get his peat into the condition of the diamond. If he does, I would advise him to sell it as diamond; if he does not even do more, it is not possible to get out of it more than 15 lb. of water per pound of diamond. This is not three times the work of coal. If he can prove his point, then there is a new practice in opposition to the theories of all the chemists of this and of preceding ages, which will enable him to give us a mechanically condensed solid fuel superior to coal. I will draw his attention to another subject. We use fuel as a gas, we do not use it as a solid. To convert a solid even into a liquid, expends a certain amount of heat which is so used, and which is not available for making steam. To convert the liquid into gas takes up another proportion of heat; and all that heat is taken away from the effectual work done. Consequently, you never can hope, by using a solid at first, to get the same result that you would get, were you to use first a liquid, or better and secondly, a gas. The best form in which to obtain combustion is that of gas, which requires little or no expenditure of heat to separate particles before entering on combustion. With regard to liquid fuel, Mr. Young has truly said that it is not dangerous, that it is not difficult to burn, that it requires no stoking. This is the result of nine months' experiment at Woolwich; I do not say that we were at it day and night, but were at it nine months consecutively. It has since been dropped because the experimental vote of the House of Commons did not enable us to go on with it. There is the state in which rests one of the most important discoveries with regard to the due economy of fuel. And, recollect, I am not the inventor, nor have I anything to do with it; I am merely the scientific advocate of the question. There rests one of the most important discoveries, which would at once enable a vessel which now goes, we will assume, with a given quantity of fuel, ten days at full steam, as the old steam line of battle ships did, to go twenty days, and if she had compound engines, to go forty days with the same. Now, that is an enormous economy; it does more to solve the whole question of Steam *versus* Sails than anything I can think of. It introduces a new field of improvement. My whole paper is devoted to the object of proving that applied science can produce more economy, if we attend strictly and closely to it, than can ever be accomplished by the most economical Chancellors of the Exchequer, or by the most economical Ministries, and this with a vast increase of real efficiency.

The CHAIRMAN: We have had a very interesting paper indeed. I am happy to say that every time I have the pleasure of hearing Captain Selwyn, he always gratifies me with the able manner in which these subjects are treated by him. With regard to the question of fuel, I must make one little excuse for Government. Government have a very large number of vessels: the machinery is already made. Of course improvements are daily taking place, and Government could not afford to alter all the engines at once. But the merchant, who is fitting out perhaps only one vessel,

No of Trial.	Date of Trial.	Time.								Time.		
		Lighting up in the small Boiler.	Steam up to 20-pound Pressure.	Occupied.	Lighting up in the Trial Boiler.	Steam up to 15-pound Pressure.	Occupied.	Coal consumed in raising Steam in small Boilers.	Fuel consumed in raising Steam in Trial Boiler.	Commencing the Experiment.	Ending the Experiment.	
19	July 1, 1869.	a.m. 8.0	a.m. 9.05	h. m. 1 5	a.m. 9.25	a.m. 10.15	h. m. 0 50	lbs. 160	lbs. 160 Coal 120 Oil 730 Total.	p.m. 12.40	p.m. 5.02	

RESULT OF TRIAL AT WOOLWICH.

"Oberon" Boiler—Tubular Marine.

Heating Surface in Tubes, 1,468 square feet; in Furnace and Uptake, 234 square feet: T

Time.			Temperature.				Weights.			Water evaporated to 1 pound of Oil consumed.					
	Ending the Experiment.	Occupied on the Experiment.	Water in the Boiler on lighting the Fires.	Feed Water.	Atmosphere.	Bottom of Funnel.	Mean pressure of Steam.	Oil consumed during the Experiment.	Water evaporated during the Experiment.	At the actual Temperature of the Feed Water.	At the constant Temperature of 100° Feed Water.	At the actual Temperature of Feed Water after deducting the Water used for the Jets.	At the constant Temperature of 100° Feed Water after deducting the Water used for the Jets.	After deducting Water used for Jets at the constant Temperature of 212° Fahr.	Without deducting Water used in Jets from constant Temperature of Feed 212° Fahr.
	p.m.	h. m.	Fahr.	Fahr.	Fahr.		lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
0	5.02	4 22	144°	62°	70°	Lead melts.	24	4312	59096	13·70	14·11	12·70	13·11	**14·98**	**16·16**

NOTE.—Former trial with Coal, in same boiler, on board "Oberon," gave for—
Quantity, 206 cubic fe
Economy, 8·4 pounds

NDIX.

AT WOOLWICH.

Tubular Marine.

e and Uptake, 234 square feet: Total, 1,702 square feet.

porated to 1 pound of Oil consumed.						Water evaporated per h				
At the actual Temperature of Feed Water after deducting the Water used for the Jets.	At the constant Temperature of 100° Feed Water after deducting the Water used for the Jets.	After deducting Water used for Jets at the constant Temperature of 212° Fahr.	Without deducting Water used in Jets from constant Temperature of Feed 212° Fahr.	Heating Surface per cubic foot of Water evaporated per hour at constant Temperature of 100° Fahr.	Oil consumed per hour.	At the actual Temperature of Feed after deducting Water used for Jets.	At the actual Temperature of Feed without deduction.	From the constant Feed of 100° Fahr. without deduction.	From the constant Feed of 100° Fahr. after deduction of Water used for Jets.	
lbs. 12·70	lbs. 13·11	lbs. **14·98**	lbs. **16·16**	sq. ft. 7·65	lbs. 989·00	cub. ft. 200·08	cub. ft. 215·90	cub. ft. 222·39	cub. ft. 208·08	

board "Oberon," gave for—
Quantity, 206 cubic feet.
Economy, 8·4 pounds per pound of fuel.

rated per hour.			Approximate Amount of Water evaporated for the use of the Steam Jets.			
From the constant Feed of 100° Fahr. after deduction of Water used for Jets.	From the constant Feed of 212° Fahr. without deduction.	From the constant Feed of 212° Fahr. after deduction of Water used for Jets.	During the Experiment.		Per hour.	
cub. ft.	cub. ft.	cub. ft.	lbs.	cub. ft.	lbs.	cub. ft.
208·08	254·76	236·09	4312	69·00	989·00	15·82

can take advantage of every improvement, without any other inconvenience than simply paying for the new alterations in the machinery. Government cannot do that, at least until the improvements have been well verified. At the same time I quite agree with Captain Selwyn that Government are much too slow in adopting improvements. With regard to sail-power, I also agree with Captain Selwyn. In steamers, particularly, the sail-power ought to be entirely secondary and subordinate to steam, except in special cases. But there ought always to be sufficient sail-power in case of any accident happening to the machinery or to the screw, to enable the vessel to draw off from a lee-shore, or to reach a port suited for repairing its damages. I also agree with Captain Selwyn that the sail-power ought never to be such that we should hope to depend upon it when a vessel is being close-hauled or beating to windward; that ought to be better done by steam, except in cases where steam is only the auxiliary power with a disabled machinery. Sail should only be made use of in a fair wind and off a lee-shore. With regard to the forms of ships, there are three particular kinds of warfare that a nation's war ships ought to be fitted to carry on, viz., coast warfare on an enemy's coast, ocean warfare, and defensive coast warfare. Each of these kinds of warfare demand special qualities adapted for that particular service, independent of the general and important qualities which should be common to all vessels of war to enable them to act together. For defensive warfare I think with Captain Selwyn that small vessels with one or two very heavy guns and the smallest possible tonnage, with some little sail-power, are likely to be very useful for defensive means which, with the torpedo and ram, and the great improvements that have taken place in artillery, throw all the advantages entirely on the side of defence *against a sea attack*, and render it perfectly impossible for our shores to be successfully invaded. I think it is quite evident that the advantages just alluded to, if we choose to make use of them, such as these small vessels, and those vessels which should be expressly constructed for the means of defence of our coasts and harbours, as rams, torpedoes, railroads along the coast, which would render us perfectly safe from any kind of attack that could be made against us *from the sea* by the combination of any number of nations. Time would fail me to enter into details as to the forms of vessels best suited for the purpose. I am of opinion with Captain Selwyn in the general principles he has laid down. The same remark will apply to the next head, the utilisation of separate forms of vessels for separate purposes; these are according to my views the three forms that I have been alluding to, and the three purposes for which the demands of naval warfare requires these forms, should be best adapted. I also agree with Captain Selwyn as to the economy of the *personnel*. It is unnecessary to go over the subject again; therefore, I shall conclude by thanking Captain Selwyn for the very useful and interesting paper that he has read.

Evening Meeting.

Tuesday, February 14th, 1871.

LIEUTENANT-GENERAL THE HON. SIR JAMES LINDSAY, K.C.M.G., Inspector-General of Reserve Forces, in the Chair.

NAMES of MEMBERS who joined the Institution between the 6th and 14th February, 1871.

LIFE.

Nicholson, H. Whalley, Capt. 82nd Regt.

ANNUAL.

Skrine, Harcourt, Lieut. 43rd Middlesex Rifle Volunteers.
Smith, Carlton, Capt. 1st Royal Surrey Militia.
O'Connell, H., Lieut.-Col. Madras Staff Corps.
Rose, W. M., Ensign late 32nd Regt.
Gardiner, R. M., Com.-General.
Campbell, Wm. M., Captain Royal Engineers.
Farrell, H. C., Capt. R.A.

THE ORGANIZATION OF OUR MILITARY FORCES.

By Lieutenant-Colonel ARTHUR LEAHY, R.E.

The CHAIRMAN: I have much pleasure in introducing to the meeting Lieutenant Colonel Leahy of the Royal Engineers, who proposes to-night to read a paper upon "the Organization of our Military Forces." It may be in the recollection of many of the gentlemen present, that two years ago Colonel Leahy,—who was somewhat in advance of his time,—read a paper in this Institution on the same subject. It received very great attention, was very much considered, and, in many respects, much approved, and it did him very great credit. The subject upon which he proposes to dilate to-night is one which has engaged the attention of military men for a very considerable period. If people will look back at the papers which have been read in this Institution, and at articles which have appeared in the United Service periodicals, they will find that "the organization of our forces" has been much discussed by military men, but it is only lately that the interest in the question has been enhanced to a considerable extent, owing to the recent occurrences upon the Continent. The subject has been so forced upon public attention that Government has taken it up, and Parliament will be asked to pass its opinion upon the subject.

Lieut.-Col. LEAHY: The object of this paper is to revive a discussion* on The Organization of Our Military Forces and Reserves, which was commenced in 1868.

The propositions on which a discussion is to be taken, have been already explained in a paper, read in April, 1868, on the† "Organization of Our Infantry Forces and Infantry Reserves," to which was appended‡ a project, worked out in detail, for adapting to our Regimental System the principle "of allowing soldiers, after a short service "in the Army, to leave its ranks, subject to the obligation of returning "to them when required." §

The suggestions in this paper had, during the previous year (1867) been privately printed‖ and submitted for consideration, in contradistinction to proposals for the re-engagement of soldiers who had completed ten years' service, and for providing reserves for the regular regiments from the Militia.

It is hoped that by means of the discussion, information will be gained as to the points in which the actual organization is defective, and the opinions of military men elicited on the technical arrangements necessary to produce the best possible defensive result from the application of the principle of "short service."

In the previous paper it was observed that the subject of Army Organization has to be considered under three heads:—

A. *Political.*

Under this head may be considered—

The object for which the military Forces are maintained.

The constitution of such Forces.

The persons liable to military service, and the conditions of such service.

The general control or checks to which the executive, charged with the management or command of the Forces, and with the expenditure of public moneys set apart for military purposes, shall be liable.

B. *Military.*

The numbers, organization, and training of the combatant troops.

The regulations under which they shall be called out.

The determination of the numbers to be annually embodied, and whether for permanent service or for a certain number of drills or days' training.

C. *Administrative.*

The government of the Forces.

[The references, when not otherwise stated, are to the Journal of the Royal United Service Institution.]

* Vol. xii, pages 337—358.

† Vol. xii, pages 310—337.

‡ Vol. xii, Appendix, p. 337, Tables I, II, III, IV.

§ See "Report of Royal Commission on Recruiting, 1866," Appendix Y.

‖ "Proposals for an Improved Military Organization, and for the Formation of a Reserve Force," 1867.

The organization by which the supply of all things necessary for the efficiency of the combatant troops is regulated.

The accessory arrangements, made with the object of increasing their defensive or offensive powers.

Under the political head, I would only observe, that it will be the duty of the military authorities to give effect to such general plan as the Crown, on the advice of Parliament, shall approve.

If it were proposed to make military service compulsory on all able-bodied youths, an arrangement under which, according to the writer of the recent article in the "Edinburgh Review," about 260,000 men* annually would become liable to a chance of military service; it is scarcely necessary to say that the problem of raising recruits, whether for the regular or auxiliary forces, would be very much simplified.

If, on the other hand, it be decided that the time has not arrived for adopting such an extreme and possibly unequal system of personal taxation, it will be desirable to consider whether, by combining with the voluntary system a careful and comprehensive adaptation to the regular forces of the principle of short service, and by arrangements for a more perfect training of the militia, the military forces of the country cannot, at a reasonable cost, be placed in a position to fulfil all conditions of offence and defence necessary for the fulfilment of imperial engagements and for national safety.

I would suggest that the discussion at this Institution should, so far as possible, be limited to the points comprised within the second head, and which are chiefly, if not entirely, technical, viz., the *numbers*, *training*, and *organization* of the combatant troops.

Opinions are therefore invited on the military and technical questions involved in the following propositions:—

I. The reform of our military organization should be such as to enable an army of about 200,000 infantry, with a due proportion of cavalry, artillery, engineers, and train, to be placed in the field for home defence.

II. In order to effect this object, it is necessary that there should be a suitable adaptation to the Regular forces of the principle of "short service," with liability to afterwards serve in the "Reserves."

III. There should be an appropriate expansion of the regimental organization, so as to bring recruiting and army reserves under the regimental system.

IV. The Militia battalions to be trained and organized so as to be at all times ready to take their place in the Defensive Army. A Militia Reserve to be formed.

V. Each military district to be provided with the nucleus of a complete staff for an army corps. One or more divisions of Regular troops, complete in all arms and requirements for active service, to be quartered in each military district.

VI. The General Officers of districts to supervise all reserve and

* Review on "The Military Forces of the Crown," No. 271, p. 220.

auxiliary forces within their districts. Brigades of the Regular and auxiliary forces in each district to be annually encamped and manœuvred, with due proportions of cavalry, artillery, engineers, and train.

I will now, without reiterating arguments frequently advanced, explain as briefly as I can the foregoing proposals.

Some of them have been so long and fully discussed, both by the press and at this Institution, that they may be accepted without dissent. No claim is made to originality of principle, but it is believed that details worked out in 1867-68 would be the means of promoting many of the objects which are admitted to be desiderata in any general scheme for Army reform.

I. With regard to numbers:—

It was shewn* that in 1867-68 the military establishments which it was within the power of the Crown to enrol for the defence of the realm, or of the possessions subject to Her Majesty, and which therefore came under the supervision of the Home, Indian, and Colonial Governments, amounted nominally to no less than 1,300,000 men; of this number about 350,000 were trained, and more or less organized. About 380,000 were trained, but not organized (men with muskets), and about 570,000 were neither trained nor organized (men on paper).

Deducting the forces in India (180,000), the Trained Bands (200,000), and the Colonial Reserves (300,000), the British "*establishments*" available for immediate re-organization amount to *about* 150,000 Regular troops, about 250,000 Reserve and Militia troops, and over 200,000 Volunteers; total, over 600,000 men.

I must observe that the establishments† are not complete.

In order to work out a project, it is necessary to assume a certain object to be attained, but as the objects for which our forces are maintained have not as yet been definitely laid down by Parliament, or other final authority, it will be excusable if the numbers proposed for the field forces should not command unanimous approval.

I have taken those for which I believe there is the best military authority, and as they correspond very nearly with the available "establishments" of regular and militia forces, they cannot be put down as extravagant.

I believe them to be sufficient to prevent periodical invasion panics.

II. Short Service:—

A general and comprehensive application of the principle of "short service" in the regular Army, with a liability to afterwards serve in its "Reserves," is a necessary condition of an elastic and economical military system.

All first enlistments should be for "short service," by which should

* Vol. xii, pages 313—319.

† A detail of the strength and composition of the British Army, 1868, will be found in Appendix lxix, p. 579, vol. i, "Military Forces of the Crown."

be understood, an engagement for not less than *one* or more than *three* years' continuous service in the regular infantry.

In the regular cavalry, artillery, and engineers, the period of service may be extended to such time as is necessary for training soldiers in the efficient performance of their special duties.

There should be no obligation on the part of men on their first engagement to serve out of Europe in time of peace.

An attempt to combine the short service engagements with service in the Colonies or in India, or arrangements which would give the recruit at first enlistment a positive option of serving continuously for longer periods than indicated, would, it is believed, be fatal to the "short service" system.

To remain in the Army should be a reward for those who by their conduct and attention to military duties during the period of short service show themselves worthy of the privilege.

Pensions should be granted not only, as now, to old soldiers, but to short service men who fulfil their engagements in respect of subsequent service in the Reserves. The pensions of the latter need not, however, commence before 50 years of age.

Service in India and at military stations abroad should be provided for by a second and supplementary engagement, which should not in any case be made until the recruit had completed one year of his short service engagement.

As a rule, the engagement for service in India should not be made with men of less than two years' service. This is necessary to ensure the Army in India being composed of seasoned soldiers of proper physical quality, and carries out one of the recommendations of the Royal Commission on Recruiting, 1866.

At certain stations abroad, infantry battalions should be replaced by Royal Marines.

By reducing the term of service to what is really necessary for the proper training of soldiers, and encouraging, so far as consistent with reasonable efficiency, arrangements with the object of preventing an interference with the industrial occupations or education of young men who volunteer for military service, an increase of the number, and a superior class, of recruits, may fairly be expected.

The inducement would be still greater, if military service were a road to Government and parochial employment.

But even if no such increase took place, a proper application of the principle advocated would enable one-half the men who now enlist to be placed in reserve so soon as their military training is complete; and we should at once arrive at the great desideratum of creating a competition for retention in the ranks of the regular Army.

By having a separate and supplementary engagement for India and garrisons abroad, the number of men annually required for long service would be reduced to less than 10,000, a number much less than the ordinary supply of recruits.

The period of service abroad could then be defined and adapted to the climate of each station.

If one in ten of the 260,000 men who annually attain the age for

military service could be induced to engage for short service, with a liability to subsequent service in a reserve force, and if one-third of the men who so engage (or one in thirty of the whole), were, after being trained, taken on for Indian and Colonial Service, the Army and its reserves could, at a comparatively small cost, be kept up to any probable requirements.

The adoption of a system of drill in all State and rate-aided schools would tend to shorten the period of military service, and, consequently, the cost of the military force.

The question of relative cost of long and short service was fully entered into in the paper read in 1868.* The financial conclusions arrived at were adopted by Sir Charles Trevelyan, and I believe they were substantially correct.

The annual pay and personal allowances of an infantry recruit amount to about £32 per annum; those of a re-engaged soldier to £40 per annum. This is irrespective of pensions.

If pensions be taken into consideration, the average pension being £20 per annum, the average annual cost will be†—

1. Of a re-engaged soldier during his second period of service, about £65 per annum.
2. Of a long service soldier, during 21 years' service, £48 per annum.
3. Of a short service soldier, during 3 years' enrolled service, about £38 per annum.
4. Of a Reserve soldier during service in Reserve, £6 per annum, *in addition to such retaining fees as may be necessary to secure his occasional presence with his corps.*

It may be observed that over 40,000 soldiers were re-engaged between the 1st July, 1867, and 31st December, 1868. Of these probably over 30,000 will survive to earn pensions at the completion of 21 years' service, and the pensions will probably average not less than £20 per man, so that unless some immediate steps be taken to introduce a system of reserve service, such as I have indicated, a very large addition, probably not less than half a million per annum, may be expected to the non-effective charges, after the year 1880.

In the Army Estimates 1871–2, just made public, provision is made for over 66,000 non-commissioned Officers and men, on the establishments of the infantry battalions and depôts at home.

If the views I advocate be correct, these regimental establishments may be increased by 50 per cent., or to over 100,000 men, without an increase of charge. Of this number, over 50,000 would be constantly present with the regiments, and 100,000 would take part in the annual manœuvres.

I make this statement deliberately, and with a knowledge of administrative details acquired during a long period of service at the War Office.

* Vol. xii, pages 327, 328.

† The calculations are based on the Government Annuity Tables (Money Returnable) in the "Postal Guide."

I therefore submit that the proposals are worthy of careful consideration and discussion.

III. Regimental Organization:—

In order to adapt our present battalion arrangements to the system of service proposed, it will be necessary that the head-quarters of every regiment shall, in time of peace, be at home, that the enlistment and training of recruits and supervision of army reserves shall be conducted regimentally.

In fact the regimental organization should be extended, so as to develope individuality, in order that it may be said of all in regimental authority, their "hearts are in the service."

Each regiment should consist of two or more battalions, one battalion being usually on Indian or Colonial service, and made up to its quota by periodical drafts of volunteers from the home battalion. To the home battalions should be attached reserves of men who had served in the ranks of the corps, sufficient to make up both battalions to the war establishment.

The Officers commanding regiments should be made responsible for the recruiting of their regiments, and be entrusted, subject to proper checks, with the management of the reserves, which are held in readiness to fill up the ranks of the corps in the event of the occurrence of war or other contingency requiring it to be placed on a service footing.

Subject to approved regulations and to supervision of the Generals of districts, they would determine the time and place at which each reserve soldier should undergo his annual training, and probably regulate the retaining fee accordingly.

They would, in fact, be generally responsible, not only for the drill and discipline, but also for the establishment and administration of the regiments.

This increase in the extent and duties of a regimental command, hould be followed by an increase of position and pay.

This could be done by creating a new regimental grade of "Colonel" corresponding to that of Colonel of a brigade of Artillery, or of Colonel Commandant of a division of Marines. The appointment to this grade and through it to regimental commands, should be made by selection.

The cost of this grade could be met by reduction of recruiting staff due to conducting the recruiting regimentally.

Regiments should be allowed to form recruiting connections in such localities or locality as may in each case be approved.

The connections to be kept up by the men in Reserve;—by occasionally encamping or quartering the corps in a locality with which it may have special connections;—and in some cases by establishing recruiting relations with particular corps of militia.

"Local connections" may thus be maintained in all parts of the United Kingdom without localizing regiments; and without creating a difficulty in respect of nationalities, a difficulty for which those who have advocated a general fusion of the line and militia have not so far, as I know, proposed a solution.*

* *Extract from Report of the Royal Commission on Recruiting* (1866).—"We would

By establishing the head-quarters of each regiment permanently at home, the changes of station need not be frequent, and facilities could be afforded for the useful employment of men whose time may not be fully employed at drill.

The several regiments could be encouraged to produce or manufacture many articles of food, clothing, and equipment, which have now to be purchased.

During the summer months battalions could be moved into camp with their service equipment.

During winter the men, especially those who had acquired, or desired to acquire, a knowledge of crafts, could be employed on productive work with profit to themselves and to the administration.

In place of deteriorating as workmen, young men could learn, without cost, crafts for which they would otherwise have to pay fees of apprenticeship.

It may be said that these are mere theories, but to those who are in doubt as to what can be done in the direction indicated, I would suggest a visit to the School of Military Engineering, where the recruits for the Royal Engineers are trained, and to the head-quarters of divisions of Royal Marines, especially of the Royal Marine Artillery, where the productive powers of the men are profitably developed, and certainly without loss of military efficiency.

Details of the composition of regiments and battalions formed under the principle advocated will be found in the appendices to this and the previous paper.

These details can be modified to meet a new distribution of the forces.

Eight company battalions are proposed as affording a larger number of cadres and as having other advantages.

It is, however, proposed to allot four battalions to a brigade, in place of three.

The system of regimental organization worked out for the infantry would, with some modifications, be applicable to the artillery and

" by every means encourage enlistment at head-quarters of regiments, and it seems " to us that if soldiers going on furlough were empowered to beat up among their " friends for recruits, for whom they would receive the regulated bringing-money, " some desirable additions might be made to the ranks of their respective regiments.

" We have examined various witnesses as to the benefits which might result from " localizing different regiments, or connecting them with special counties or dis- " tricts; but we cannot say that this would be a desirable or expedient course.

" On the other hand, strong evidence has been laid before us showing the advan- " tages resulting to recruiting from a local connection being maintained between indi- " vidual corps and certain localities. Men enlist much more freely in corps which " already contain a number of their friends and acquaintance; and such connections " should, therefore, we consider, be in every way encouraged. Much may be done " in this direction by strengthening the relations that exist between particular corps " of the Army and particular Militia regiments, whether arising from county deno- " mination or other circumstances, and the object might also be facilitated by the " line regiments supplying good non-commissioned officers to the corresponding " Militia regiments, and by directing the volunteering from each Militia regiment to " one, or even two or three, regiments of the line."

cavalry, but should be accompanied by arrangements for a reserve of horses.

For 100,000 regular infantry there should probably be not less than 13,000 enrolled and 19,000 reserve cavalry.

The present number of trained cavalry horses (less than 7,000) appears very inadequate.

The proportion of cavalry for the militia has also to be organized.

For the field artillery I should propose a further increase of field batteries.

I would, with deference to artillery authorities, suggest that it would be desirable to have 4 gun batteries;—numbering about 100 Non-commissioned Officers and men, and 60 horses;—as a Captain's command.

Two of such batteries would form an appropriate command for a Field Officer, and be the proportion for a brigade (4 battalions) of infantry.

Each battery should have a duplicate equipment in reserve, and a proportion of the Non-commissioned Officers and men in reserve (say 50), and of the reserve horses (say 30), should be liable to appear at the annual manœuvres.

The number of the batteries at home have recently been made up to 56, of 6 guns each; total 336 guns.

I would convert these into 84 batteries, of 4 guns each; total 336 guns, and provide each battery with a reserve. During the summer manœuvres, 500 guns could be brought out, and arrangements matured for making up the total number of guns to 672.

The Engineer Reserves might consist—

Of Non-commissioned Officers and sappers, who, not being skilled artificers, had gone through a full course of instruction at the School of Military Engineering.

Of men on the Ordnance Survey, and of artificers belonging to crafts not employed in building operations, for whom suitable employment could be found in Government or private factories.

Of men of less than 50 years of age who had served a full period of home and colonial service.

IV. Militia:—

With regard to the Militia, objections present themselves to plans for localizing regiments of the line,* or to such a general fusion of the regular and militia forces as would do away with the distinction which now exists between our "offensive" and "defensive" forces.

It is therefore conceived that the Militia reform should be regulations as to training such as will bring the force up to that state of efficiency which will enable each battalion to fill up the place assigned to it in an Army brigade or division.

In order to do this, a proportion of Militia Officers, Non-commissioned Officers, and men might be annually trained with the regular regiments.

I deprecate proposals for using the Militia as a training school for the line. There are over 3,000 Officers and over 9,000 Non-commis-

* See Extract from Report of Royal Commission on Recruiting. Page 8.

sioned Officers on the Home Establishment of the regular infantry, a number sufficient to train any probable number of recruits.

The present establishment of the Militia of the three kingdoms is 120,000, with power upon invasion, or imminent danger thereof, to raise it to 180,000 men.*

Arrangements therefore should be made for organizing a Militia Reserve (under this term is to be understood a reserve *for* the *Militia*, not a reserve for the *Army* to be taken *from* the Militia) to enable the force to be made up to the larger numbers.

This reserve should consist of men who had served a full period in the Militia, or of soldiers who have served in the regular Army and who are not enrolled in the "reserve" of their regiments.

With regard to officering the Militia, arrangements have been suggusted for taking all, or a considerable proportion of, the Officers of the Militia from those who had served in the regular Army.

Any arrangement that will provide an outlet from the grades of Subaltern and Captain in the Army, and thus reduce the proportion of Officers seeking for service in the higher grades, will be attended with advantage to the regular Army and ought to conduce to the efficiency of the Militia.

There should be an outlet for two-thirds of the Officers who join the Army, and this outlet would most appropriately be, to officer the Militia and Volunteer forces.

I take for granted that the officering and command of the Militia will be transferred to the Military Administration.

V. Military districts:—

The next point is the organization of "Divisions" and "Army Corps."

The administrative unit should be the military district containing two or more divisions of infantry, and one or more brigades of cavalry, with due proportions of artillery, engineers, and train. Each district will thus contain the nucleus of an army corps.

A proposed distribution of districts is illustrated by a map, on which are shown suggested positions of the head-quarters of districts and brigades, and the camps.

In this plan the districts are arranged mainly in reference to the railway communications and existing barrack accommodation, the head-quarters being conveniently situate, in reference to the outlying brigades and stations.

Thus the southern division, with its head-quarters at Aldershot, (which would contain the nucleus of an army corps of 50,000 infantry

* The original and additional numbers are—

For England (by 15 and 16 Vic., c. 50)	80,000 40,000
For Scotland (by 17 and 18 Vict., c. 106; 23 and 24 Vic., c. 94)	10,000 5,000
For Ireland (by 17 and 18 Vic., c. 107; 23 and 24 Vic. c. 94)	30,000 15,000

for the defence of the South Coast), would have the command of the South-Western Railway and its branch lines.

VI. Annual Manœuvres:—

It would be the duty of the Generals commanding districts, and of the Brigadiers, to supervise all reserves and auxiliary forces located within their districts, and to conduct the annual manœuvres. They should make themselves thoroughly acquainted with the whole of the defensive resources and requirements within their respective commands, including the arrangements for transport, the means of procuring at short notice additional horses for the cavalry and artillery, the positions to be entrenched, and all the numerous arrangements necessary for turning the forces under their supervision to the best possible account in the event of war or invasion.

The arrangements for the management, repair, or destruction of the railway communications within the district should be carefully prepared by the Royal Engineers, in concert with the officials of the railway companies, and of officers of the Volunteer Staff Corps who have taken up that subject.

The outlying brigades and the Militia should take part in the annual manœuvres.

Places should be assigned in the field force to battalions of Volunteers which come up to the necessary standard of efficiency.

With a peace organization and distribution of the Regular and Militia forces such as indicated, and a corresponding organization and distribution of the cavalry, artillery, and engineer corps, there would be no difficulty in putting into the field a defensive force of the strength suggested in the condition of our problem, viz., 200,000 infantry, with a due proportion of the auxiliary arms, nor would there be any delay or difficulty in sending abroad an expeditionary corps of (say) 80,000 infantry with a due proportion of cavalry, artillery, and engineers.

If a larger expeditionary corps was required it could be organized within a few weeks.

There are many points connected with the organization of our military forces which have been purposely omitted from this paper, with the object of bringing the points for discussion within reasonable limits; for instance—

Garrisons of Fortresses.
Colonial Reserves.
Purchase.
Army Administration.

Some of these subjects have been referred to in the previous paper, but they are purposely excluded from the present discussion.

Colonel OUVRY, C.B., late 9th Lancers: I should wish to make a few observations on the paper which we have just heard read, and in which the subject is explained in the most clear and lucid manner. I think that as there really is only one recognized law among nations, namely, "the law of the strongest," it behoves us to look to our own safety, and see that our Army has such an organization as will enable it to meet successfully any aggression which possibly may occur. In order

to form a proper notion of the number of men requisite for defence and offence—for, as Col. Leahy has justly remarked, one is part of the other—we must look to the state of the armies of other continental nations, and regulate our own accordingly. The amount of force should not be greatly inferior to that of others, always, of course, having a due regard to geographical or other natural peculiarities.

I should be sorry to advance my own unsupported opinion of the proposition which we have heard concerning the Militia, but finding it in unison with that of the man whose experience is the greatest, and whose views are of more value than those of any other living Officer, I allude to Count von Moltke, I will simply quote his words. "The difference between a Militia and the Prussian system consists in the fact "that one is merely an armed raw levy, while the other is a nation in arms trained "to habits of military discipline and obedience."

There cannot be the slightest doubt that all wars of the future will be conducted by enormous levies, and the nation which has failed to supply the proper element for such large levies in peace time, before the war breaks out, will have to take the consequences, which probably would be defeat. Now if such are the conditions required to render a nation secure under present circumstances, it behoves us to see how we had better set to work. We have here a proposition before us by Colonel Leahy, and, first of all, under the conditions in which we live in England, we must see how the people would acquiesce in it.

A writer in the *Fortnightly Review* remarks "that a tremendous power has been "evolved and a ruthless ambition been manifested by the Prussians throughout the "war, and no nation is safe."

No nation is safe, certainly, which does not make the necessary preparations in peace time, and with regard to this, another writer in the *Fortnightly Review* says:—

"But the Prussian system is impossible in England; England will never consent "to undergo Bismarkism. Any attempt to force the working man into the ranks "will be resisted even to the '*ultima ratio populi*, no blood tax shall ever be levied "'in England.' If such is attempted there will be an end to the ruling classes and "the monarchy."

Now I only ask how is it possible to organize under such an ignorant impatience of performing a natural duty, as is evinced in the above quotation, a natural duty which is submitted to by all other nations?

If the people of this country decline to submit to the sacrifices necessary for their own defence, then they may experience the fate of the nation of old, which cried for *panem et arcences*, and let the defence of the country shift for itself. The grand evil may not come in our time, but we may see England sink into a second Holland, and be blotted out for ever from among the great powers of Europe.

General SCHOMBERG, R.M.A: I should like very much to make a few remarks as to my great regret at hearing that the localization of regiments is to be entirely thrown aside. My belief is that the whole success of our system of reserves hangs on localization. The lecturer, to whom we are so very much indebted, was good enough to instance the Marine divisions as types of pretty good order and success in organizing artificers' work. I had the honour of commanding the Marine Artillery for three years, and can speak on *this* subject. Now, I believe the reason we are instanced for our success in organizing military labour is simply because we are localized; it gives us time to look about us. And we certainly do our foreign work as well as our neighbours. When I had the honour of commanding the Marine Artillery we had about 1,400 to 1,600 men at head-quarters. We embarked a regiment yearly, 500 or 600 men; we had no difficulty in getting men to embark. Embarkation was considered rather a boon than otherwise. I am sure localising regiments would not make them too fond of their homes. Moreover, you would never be obliged to send a married man abroad at all. You might send your men after two years on foreign service, and bring them back at the end of seven years. I am sure you will never get regimental schools in good order, nor will you succeed in organizing and working military labour, unless you localize corps. I fear the great objection is the expense of building barracks. Now I believe if you placed regiments in their own counties the men would build their own barracks with the help of our friends the engineers,

and that in three years you would pay all the expense of your barracks, and save not only public but private pockets. I think if the system of local organization is knocked on the head, the system of local reserves will go with it.

With regard to instruction. Englishmen are rather given to fall into particular grooves. If an Englishman is a sportsman he is exclusively a fisherman, or hunts or shoots exclusively—he does one thing in particular; and I think we follow exactly the same plan in the Army. The infantry man is exclusively an infantry Officer, and the cavalry man knows nothing whatever about infantry, and the artillery man ditto. An attempt has been made to cure this in the Staff College, but what are they among so many? Officers should be trained to know all three arms and to see them work together.

Lately I have been fortunate enough to get a book issued by the Prussian Government just before the war, dated June, 1870,*—the last instructions issued before the war—for outpost duties and grand manœuvres. The duty of the three arms is beautifully drawn up in this book; we have nothing to compare to it.

We have many things to learn, but there is one thing which we have to unlearn—that is centralisation. We have taken all the powers out of the hands of our Commanding Officers. The Captain of the company can do nothing; the Colonel very little; and the Brigadier or the General goes into the field in war totally unaccustomed to the feeding of his own troops or providing them with necessary stores. In this reorganization of our forces I do hope the Commanding Officers will have a little power. I believe a Prussian Captain, who answers pretty much to our Lieut.-Colonel, can give a man seven days in the cells.

The *Fortnightly Review* was alluded to this evening. I think it is a great pity when we are discussing a subject of so great national importance that anybody should apply hard words to classes or individuals. A writer of great repute has spoken in very harsh terms of the English army in this *Review*. He says (I read the article a few hours ago) that the Officers of the English Army are "*proletaires*" and the men "pariahs." I think these expressions cruel and unjust. I am not a linesman, so I may speak freely. I think the services of our line have only been equalled by the Roman army. I think in the history of the world no troops have ever had so severe a foreign service as the English Line. They have done their duty well whenever they have been called upon; they have not surrendered in thousands. I think it is very hard that these expressions should be used of our Officers and men. The same idea has not always been held about the Army. There is a book which we were taught to reverence when we were children; in this book a soldier's name is always mentioned with respect, and centurions are, in all instances in which they are mentioned, held up as men of religion and good conduct. I think the English Army is not inferior to the Roman.

The Duke of MANCHESTER: I should like to make a few remarks on this subject, as one in which I have certainly for a great many years taken a great deal of interest. Though I was greatly interested in, and in the main agree with the whole scheme of Colonel Leahy, there are some details in it in which I think he does not go as far as I should like. I may also mention, the two last speakers have both referred to points in which I entirely agree. The first speaker intimated that it was his opinion that it was the duty of every Englishman to take part in the defence of his country. That is the point with which I would start. When I have suggested that in conversation, I have always been met by the answer that it cannot be done. Well, we have not to do here with legislation; we are discussing a subject, and endeavouring to arrive at the principles on which we may hope that legislators will act, and I do not see why we should cry "stinking fish" by, in the first instance, saying we never can persuade Englishmen to do their duty. I fancy it is quite possible, especially now, when as the gentleman who first spoke remarked, evidently more than ever, success goes with great battalions, the English nation must feel more or less that their opinion has not that weight in Europe which it once had,

* Title, "Regulations for the Instruction of Troops in Field Service, and for Great Manœuvres," Berlin, 1870.

and they must attribute that in a great measure to the weakness of our forces. I think Englishmen are patriotic enough to be willing to make some sacrifice for the increase of their strength and for raising a force adequate to their position in the world, when so small a state as Switzerland has an organized force, not merely men in arms, but a fully organized force, of 200,000 men. If I may be allowed to allude to a personal matter to illustrate my position, I would tell you that on the 14th August last I was at Herny, in France; at that time the King of Prussia's head-quarters were there, and Count Bismark was talking to me about our engagement to support the neutrality of Belgium. He turned round and asked me suddenly what army could we send to support Belgium. I said I understood we could send about 40,000 men. At that time there were 500,000 men pouring into France, while France had some 200,000 or 300,000 men. What would our 40,000 men have done against them? It was a humiliating position for an Englishman to be in. Yet we have 30,000,000 in the United Kingdom, and if we take the British race in the colonies, we have some 5,000,000 or 6,000,000 more. The population of France is 38,000,000, and that of Germany about the same. Why should we not have forces equal to them? Our wealth is equal to theirs, and I should have hoped our patriotism was equal. The ballot system has been advocated by Lord Elcho very ably, but I am opposed to the ballot. I think it is unjust and partial. If you have substitutes it gives an unfair advantage to the very rich; if you do not have substitutes it is an unfair burden upon not only the very rich, but the middling rich classes, because of course the burden of service is heavier upon people who derive greater profit from the occupation of their time than upon the poorer classes; therefore, if a man is obliged to serve, whatever his position in life, it is a heavier burden to a rich man than to a poor man. I think the only way in which it can be done fairly, is to make every man serve, that is, to learn drill; to be drilled rather than serve, for a short time. My opinion is, that you should call upon every man to be drilled, say for two years. There I differ from Colonel Leahy. I would say that the depôt of a regiment should be in the district from which it is recruited. I must say I think there is a very great advantage that the regiment should be localized. One great advantage of that would be, that the Militia battalion should be part of the regiment—a Militia battalion of a definite regiment, and a volunteer battalion another part of the same regiment. I would therefore call upon every man to drill in the depôt of his regiment, in his own district, near his own friends, within easy reach of his own home, where he is not separated from his home influences, where, while he is serving, he may get comforts and clothing and other things from home, and may get short leave to go home during his time of drill. After he has served his two years, I should suggest that he should then be given his option of being posted to the Militia battalion, merely for service at home say, or if he was inclined for more service than that, he might be enlisted for the reserves of his regiment. Then he should have another year's permanent drill and be liable to be called out for more periodical drill during the time of his service; or he might enlist for permanent service in the regular Army. One advantage of that would be, that you would have a great many men. I do not wish to call them bad names, but there are a great many loafers and people who have no particular occupation in the country, and are too fond of independence and of pleasing themselves, to settle to anything definite, and who might make very good soldiers, and probably would, if they could be got into the Army any how. By this system you would force every young man on attaining a certain age to be practically in the Army for two years, and I think a great many of these men when they tasted military service, would probably be very willing to continue what they found to entail no great hardship, and even a very comfortable sort of life. Many of them who have no particular resources, and are very badly off for clothing, and have no definite home, would find those provided for them in the Army. You may call them scamps, but scamps do not make bad soldiers if you once get them disciplined, drilled, and organized. Then on the other hand, the one object to consider would be that this permanent drill which you call upon every young man in the country to perform, should not press too heavily on what I may call the better classes, those who make a greater profit by their professions, and derive large incomes from the

occupations they intend to follow. In the first place, I do not think two years would be a very heavy burden on a young man who had finished his education before he began his profession; but I think you might make it lighter even than that, because if a young man had attained a certain degree of education, you might either by his passing an examination or having gained a certificate in some school or college, allow him to serve for a much shorter time at his own expense, to find his own clothing, to pay for his own food, and to find his own lodging during that time of drill, say for nine months or a year. You need not oblige him to live in barracks with the common men, but he must do his duty as a private soldier for that time, living among others of the same position in life as himself, but drilling in the ranks. By that means every man, whether he was to be a private in the regular Army or in the reserves, or the Militia, or Volunteers, or an Officer in any of the forces, would have served a certain number of months, perhaps a year, in the ranks, and I do not think there would be any great disadvantage in that. Perhaps that is all I need say on that point. I am afraid the time allotted to me has expired, but I should like to say a word about organization. I think it is most important that the whole force should be organized into *corps d'armée* with proper distribution of the different arms, and when that is done, I believe no good will be done until you imitate war in peace by having manœuvres across country, not previously laid down but depending on the features of the country; not in fixed camps, but produced by two equal forces moving against each other from a distance. There the intelligence of each individual Officer would be exercised. Those manœuvres would be an examination as well as an instruction to every Officer. By that means you will find out who are the most intelligent Officers, and you will be practically deriving the experience of war without bullets.

General RUSSELL, C.B.: I understood General Schomberg to say that localization was a great benefit, and was the means by which the Royal Marine Artillery were so successful in raising recruits, and in having their men so willing to go abroad on foreign service. Now I have attributed that to the free ration when on board ship, and I have not the slightest doubt that our own men would be as delighted to go abroad and serve as the Royal Marines are, if they had their rations free. I have always been a linesman, and have been recruiting in London in conjunction with the Marines, and I thought the advantage they had over us in the line was the fact of this free ration on board ship, that the Marine went away for three or four years, came back with plenty of money, went home to his friends in the country and was a gentleman for six weeks following, whereas our linesman goes on furlough on 8*d.* a day, and instead of helping his old parents and his brothers and sisters struggling through life, he is a burden upon them during his furlough. Besides that, it is no inducement to friends to urge a young man to go for a soldier, because from that moment they know that they can never hope to have the slightest advantage from his help in their poverty and distress. The Marines do assist their friends, whereas our men are so paid that they cannot do it. I think one disadvantage of localization in the line is this. In my regiment in Jamaica we lost every third man in six weeks from yellow fever. Now if that regiment had been recruited from a small area, could you expect to get fresh men for that regiment? We were fortunate enough to escape cholera in India, but the 86th lost, I think, 126 men in one night at Kurrachee. What hope would that regiment have had of recruits, if localized?

Mr. CHADWICK, C.B.: I beg to solicit attention to some of the organic conditions which some military authorities concur in regarding as the basis of Army organization, namely, widely different qualities and values of different units, ranks, and files, the bases of force. Whilst all attention is impliedly concentrated on the Prussian system, there is one great example which is beginning to attract public attention that has not hitherto been noticed in this discussion, which is even more important for consideration, viz., that of a nation with two millions and a-half of population, which within two days after the opening of the war, had on its borders an army perfectly equipped of 30,000, and in four days 40,000 men, and in a fortnight it would have been ready with an army of 200,000 men—just the total amount of defensive force proposed for Great Britain. I mean the army of Switzerland. I have heard English Officers who have inspected the army there, and their opinion

was that the unit of force, the rank and file of the Swiss Army, at all events, whatsoever it might be with the commands, was quite as good as any brought into the field by Germany. And I am assured that the Swiss Army was seriously examined ten years ago and six years ago for a purpose by Prussian Officers, who reported that it was highly to be respected, and might hold its ground against their own. And yet this army of acknowledged first-class discipline and efficiency (proved indeed in portions of foreign service, and highly valuable for trustworthiness) is raised, without the three years', or even the one year's continuous service spoken of to-night as essential. Its discipline is imparted to the rank and file by really not more than a month of drill and exercise in the adult stages, produced to a great extent in some cantons by early drill in the school stage, which I have been advocating in this country. The last report of the military authorities of Switzerland was, however, that to smarten their force and bring it up to what was requisite —having regard to the standing army of France on one side, and of Prussia on the other, they desired about two weeks more of drill and field exercises, as a manœuvring field force. The basis of the Swiss system in some of the cantons is in the general drill of the population in the school stages, and hence an educated and intelligent unit force. In a paper which I had the honor of reading at this Institution, I cited a great deal of important and, what I submitted as I think, very conclusive English military testimony as to the vast difference that there is between the educated unit and the uneducated unit. It was brought out, I believe, by that testimony most clearly that an educated force, putting it as a simple proposition, is superior to an uneducated force in the proportion of three to two for the purposes of war. That was before the great Continental war. And, looking at the action of the comparatively better educated rank and file of Prussia as against the less educated rank and file of France, I submit that proposition has been verified on the largest scale that was ever presented to observation. Good education in the school, imparts intelligence, obedience, patience, more thoroughly than it is ever imparted afterwards. Bad education, or no education, leaves unintelligence, passion, and wildness. Some military authorities attribute the efficiency of the Prussians to the long service in the barracks. We attribute it to the intelligence imparted in the school, for the schooled force have beaten the longer barrack-trained force, three to one, and even two to one with inferior weapons, the needle-gun against the Chassepôt, and overthrown them in fair fight, infantry against infantry, against almost all military opinions in this country. Well, you have that instance of the great efficiency of the educated unit of force. Our proposition is that that may be had without that extent of long continued service, which is yet talked of as essential, since it is had without it in Switzerland, and why cannot we have it here? I must say, speaking generally, the the Officers of our English Army, high and low, are almost exclusively used to one unit of service, namely, the uneducated rough, the man to whom the lash may be applied ("No, no"). No? Why look at the last report of the military governors of military prisons: they say, one after another, that the lash being abolished, was a fatal mistake, and that without some equivalent punishment is to be got, the discipline of the English Army is not to be relied upon. ("No, no.") What do you say to 25,000 court-martials in a year in that force, and to 8,000 imprisonments, and between one and two thousand permanent markings in one year, and the treatment of these conditions as normal conditions of the Army?

The CHAIRMAN: You must adhere a little more to the propositions of Colonel Leahy.

Mr. CHADWICK: Now as to the character of that force and of the line generally, there are particular exceptions, and I have known of great exceptions. I was informed of one, a Scotch regiment, the Colonel of which regiment offered a wager that he would go upon parade and borrow £1,000 from the privates.

The CHAIRMAN: We are diverging from the paper.

Mr. CHADWICK: But the paper assumes as the basis of organization a unit of force, of a common quality, which assumption, I submit, is in respect to efficiency, fallacious. Let me say that Officers who have had charge of different kinds of forces, military Officers of extensive experience and observation, who have had charge of

the police force, say that two of their men are worth any three of the ordinary soldiers, for effective purposes and efficiency considered, are cheap at higher pay; and I have heard Sir John Burgoyne maintain, and I believe he maintained with success in evidence, that the Sappers and Miners, though they are a higher paid force than the rank and file, and the Officers are on the whole—efficiency considered—not a dear if not a cheap force. But the question is what you can produce in training without the ballot being long continued and compulsory. What did Lord Hardinge say before the Sebastopol Committee? He said he could prepare soldiers in sixty days. Now, if he can prepare an uneducated man in sixty days, what can you do with an educated rank and file to begin with, as they begin with in Switzerland. The Swiss army costs £2 per head all the way round; that is for a month of service.

The CHAIRMAN: I think Mr. Chadwick is diverging to a considerable extent from the matter before us. He is entering into the question whether the Army should be an educated Army or not, and Colonel Leahy's lecture is how you will organize a certain number of men in the best mode for the defence of the country.

Mr. CHADWICK: Allow me to submit that my point is, that to organize an educated force, is a widely different operation from organizing an uneducated force, which Colonel Leahy's paper assumes, and it is that assumption which I challenge, as an unsound though a common foundation.

The CHAIRMAN: I must say, as Chairman, you are diverging from the question before you.

Mr. CHADWICK: All, then, that I would say is, that on the Swiss system we could raise 400,000 at £5 per man, for a month or six weeks' service, at two and a half times the expense incurred in Switzerland, a price declared to be sufficient to raise a force as efficient as the German rank and file, upon the volunteer principle we now raise 20,000 men for the line, and if the question of the great difference in the quality and the economy of the unit of force be not the foundation of any stable organization of military force, I, with others who have examined the subject as economists, am very greatly mistaken. In obedience to your ruling, I forbear to press the question further.

Sir CHARLES TREVELYAN: We have all observed with great satisfaction the rapidity with which public opinion has matured on this subject all-important to our nation. We are substantially agreed on the main principles; we are virtually working on the same lines; and this is owing in very small degree to the Parliament, composed of Queen, Lords, and Commons. The whole nation has sat in Parliament on this subject, which so greatly concerns its most vital interests. Private conversation, the newspaper press, pamphlets, more than any, the discussions in this room in which we are sitting, have produced this result. The value of our discussions has been owing in a great measure to Colonel Leahy. I shall never forget the impression which a single sentence in his first paper made upon me. It seemed as if we had found the solution of the whole problem. It was agreed that our Army was totally insufficient in number; it was agreed that a much larger Army was necessary; but a much larger Army, constituted on the same principle, would have cost an impossible sum. Colonel Leahy simply said "one long service soldier costs as much as ten reserve men." That simple enunciation spread through the length and breath of the land, and from that point the discussion took a fresh start. I differ with great reluctance from Colonel Leahy as to the limited extent to which he would carry the principle of localization; nevertheless, although a civilian, I must express my opinion. I agree with the Duke of Manchester and General Schomberg, that the key to the position, is the localization of the line regiments. There are various reasons, but I will only mention one. It is only in this way that the regiment can be made a home to the youth of the country. It is only in this way that the retired men can form a regimental reserve, settled, for the most part, in the neighbourhood of the regiment. Colonel Leahy admits that the reserve must not be a general reserve, scattered all over the country, but a regimental reserve. The west of England furnishes an interesting illustration. General Schomberg knows that the Marines are extremely popular in Devonshire and the western part of Somersetshire. We have all a home feeling there towards the Marines. The

circumstances of the marine head-quarters at Plymouth, and of the favourable conditions of service on board ship, are known in every village, and the state of feeling there in respect of this branch of the service is such as might be produced in every county in England in reference to its own line regiments. The same state of things existed in regard to the artillery in a large district in the north of Ireland, owing to peculiar circumstances connected with the recruiting. I think we are all agreed that the local Militia regiments should be affiliated more or less to the line regiments. There is another point on which I am persuaded that Colonel Leahy would agree with me, that, in order that a *man* may become a *soldier*, it is necessary that he should learn, not only drill, but discipline. In an assembly like this, it is quite unnecessary to explain what discipline includes. It includes, first of all, self-confidence, founded on full professional training—confidence of the soldier in himself; next, confidence in his comrades, his right and left hand man; and, above all, confidence in his Officers. Now, to say nothing of gymnastics, drill, musketry, and all the hundred things a soldier has to learn, it is simply impossible that a Militia man can learn discipline in one month; and, no matter how often that month is repeated year after year, the chain is broken, he is always learning, and never coming to a knowledge of the truth, and never becomes a soldier. For this reason I strongly hold that every man who enters the regular Army, including Militia as well as line, should go through a year's, or, some would say, nine months' *continuous* training. More than that, I am of opinion that the Militia regiments should not only be affiliated to their respective local line regiments, but that they should actually form second and third battalions to them. Now that purchase is going to be abolished, that is not necessary to my argument. I will say, if purchase is going to be abolished, it will become quite practicable to have only one cadre of Officers and one line of promotion for each county regiment, including the Militia battalions, as well as the line or general service battalion; and then the natural course of service would at once take place between different classes of Officers. The younger unmarried men who wished to see the world, would go to India, or wherever else they were wanted, and as they married, or as the young men of fortune succeeded to their property, and wished to engage in county business, and so on, they would retire into the Militia battalions of the regiment, receiving pay only while they were actually serving. I said that every man should be trained for a year, and at the end of the year he should take his choice whether he would return at once to civil life as a Militia man, subject only to a few days exercise in the annual field manœuvres, or whether he would enter the line for a limited term of years. As the great difficulty is to get a young man away from his home and under the colours, and as it is found by experience that when a young man has once been trained under the colours, and accustomed to military habits and military associates, he easily goes on for a further period of service, I think there would be no difficulty about recruiting. Of course every facility would be given for transferring trained men from the Militia to the line; and, on the other hand, the matured, seasoned men, who had served their three years in the line battalion at home, or in the Mediterranean garrisons, or their seven years in India, would return into the reserve of their regiment. We are all agreed that all branches of the service should be under the General commanding the division, and that the great northern division, containing so many millions of inhabitants, should now be split up into four or five separate districts, each with its own Army corps. No form of conscription is at present necessary. I am persuaded that if the Army is properly re-constituted, and if, to a certain extent, according to the plan I have submitted, the Army is constantly embodied in the face of the population of each district, in connection with their relations, friends, and acquaintances, and if certain other inducements are offered which would be highly conducive to the efficiency of the public service, there will be no difficulty whatever in getting a sufficient number of recruits. This nation has always shown a strong military spirit, which is not likely to be diminished by the example of recent events.

Captain WALTER: I should like to make a few remarks upon this subject. I think most of the speakers, and Colonel Leahy too, have rather begged the question to a certain extent. He has assumed that it will be easy to get men to organize. Now everybody here knows perfectly well that there has always been the greatest difficulty

in the world in procuring them. The one great difficulty with the English Army has been that of getting recruits. That is a subject which may be fairly taken into consideration to-night; and I have one particular reason for asking you to consider it, because it affords me an occasion of stating that there will be perhaps another opportunity of entering into it to-morrow, when any gentleman who can come will hear Lord Derby make a speech on a subject which cannot fail to engage great public attention, and certainly will be brought on in the House of Commons, I hope with success. Our plan is simply this. In order to induce recruits to enlist, you shall throw open to them the whole of the civil appointments in the service of the State. These civil appointments amount to at least 100,000 comfortable situations, ranging from £50 to £150 a year. In addition to these 100,000 situations under Government, which from time of memorial have been the spoil of political parties, you have at least 150,000 more of a semi-official character which might properly be given to soldiers, and held out as a reward to them. I am convinced if that is done, you will simplify the whole question very considerably. It is very little use talking about organization until you have something to organize. At the end of the Crimean War we were 60,000 men short of the number voted by Parliament, and really it seems to me a perfect farce to hear men calling themselves statesmen talking about reserve forces, when you have not got such a thing in the country. What is the use of having 500,000 Militia and 150,000 Volunteers if the Guards or the Rifle Brigade are 100 men short of the number they want to face the enemy? Not the slightest use in the world. I say no man is to be looked upon as a soldier in the best and most extended sense of the term unless he is able and ready to go anywhere at five minutes' notice. That is the utmost time any good soldier requires. I say a man who means soldiering must be ready to do this, and I venture to say there is hardly a gentleman in this room now, however old he may be, who will not endorse this opinion. This is not foreign to the object of this meeting, and I think, therefore, before you enter very much into the subject of how you are to organize men—whether you are to get them from one particular county to go into a particular regiment, or not—we should consider the best means of getting them. There is no doubt that the men are fit for the civil places I have referred to, and, if not, you may depend they will make themselves so.

The CHAIRMAN: Remember that the subject before the meeting is "organization."

Captain WALTER: I am in the hands of the Meeting. I think so far it is part of the subject, because, in one of his paragraphs, Colonel Leahy has alluded to the possibility of opening out the Civil Service. I have had something to do with the management of men for some years past, and I have come to the conclusion that there is really only one way of managing them, and that is by making everything their interest. It is not a difficult matter to rule men without guard-rooms and flogging. My system is similar to that which has been observed in the Life Guards with the greatest possible success for many years, and should be adopted throughout the whole Army, *i.e.*, the immediate expulsion of every disreputable character.

The CHAIRMAN: I must appeal to the Meeting again, and to the honourable gentleman; I think he is diverging from the paper Colonel Leahy has read.

Captain WALTER: I have stated nearly all I wish to say. I believe there is not an Officer in this room who does not heartily wish that the road to the Civil Service should be thrown open to our soldiers and sailors, and, if so, let them do all they possibly can to encourage it.

Captain EVANS-FREKE AYLMER: We have heard a very able paper from Colonel Leahy, but it has chiefly been confined to supplying the unit of the service. We have not had much said about what we are to do with the unit when we have got it. He remarks at the end of his paper that he can put under his system 80,000 infantry in the field as an expeditionary corps, while a larger one can be organized within a few weeks. He does not say how it is to be organized. I think before we try to catch our hare we should be prepared to cook him. We have only now in England about 80 battalions, and if they were increased by any system of reserves, either the Duke of Manchester's or Colonel Leahy's, or any other, to the fullest extent, they would only represent about 80,000 men, while in the field they would be a good deal

less, because through the exigencies of war they could not be kept up to the full strength. Now this force is perfectly unsuited to the warfare of the present day. If we go any length from our base of operations, the length of line must be protected, our supply, convoy, transport, and everything must be protected, and prisoners must be guarded (I hope we shall take some). Under those circumstances I say that 80,000 men is too small a number, and with our military forces organized as they are, or as Colonel Leahy proposes, I do not think we could put into the field, without using the Militia, more than 80,000 men, no matter how good the system of reserve might be. The Militia we cannot use for this purpose as they are at present constituted, and we have no other cadres which we could fill up, no matter how strong the reserve, and this is, in my opinion, our weak point. This is the point first to be considered; before we think of getting the men we must first see how we are to use them. There has been one system suggested by Lord Elcho in one of his letters, by which certain Militia regiments should be allowed to volunteer for service abroad, but this, I think, is wrong in principle, because the Commander-in-Chief, or the War Minister should be able to say exactly how many men he could put into the field at any given moment. That is the first thing necessary, and if he leaves it to the volunteering of Militia regiments to say we will go or not, he is never able to declare how many men he can put into the field. Taking then as my standing point that it is necessary for a War Minister to be able to speak thus, I say I hope we shall have some system which will give us a greater number of battalions, or a system by which a greater number of battalions can be formed when required. Colonel Leahy by his system proposes, after bringing up his first reserves, so as to put 80 regiments in the field, to bring up his other reserves in a few weeks, and to form new regiments. Now, that is almost an absurdity under the circumstances, because with all our Officers, and Non-commissioned Officers in the field, it could not be done. There is another system which I should like to bring before this meeting, which I think a far preferable one, and which has been supported by Lord Derby, namely, doubling the Militia regiments, by giving to each, another battalion, one battalion being officered by retired and half-pay Officers, and enlisted for service abroad, the other officered as at present, for service at home. Under such a system we should have our 80 line regiments as the first line, and as our second line, 130 battalions of infantry Militia (for that is their present number), for service abroad. These men, of course, might have a little extra training, and more attention paid them. Beside, they would be officered by Officers retired from the Army. Therefore, we should have 80 line regiments in England, and 130 battalions of Militia, or 210 regiments which would, of course, represent a force of about 200,000, and that would be without weakening our defensive forces in the slightest. Lord Elcho's system of letting Militia regiments volunteer on the system practised during the Crimea, by which individual men, the units of the Militia, were allowed to volunteer into the Line, is simply robbing Peter to pay Paul, robbing the defensive force to increase the offensive, and that is a most rotten system, because a Commander-in-Chief can never say how many men he can be certain of for any particular duty, but has to look to volunteering at the moment that he wants them. We have left this, the chief point, out of consideration, and I think it requires more attention than any other, namely, how we can place our men in the field when we get them. I will just say one word about localising corps, because I mentioned my opinion on the subject to one of the Council, and although I know it is contrary to the views entertained by a great many here, still I think it would be cowardly if I refrained on that account. I think localising will never do with our Line regiments, for this simple reason. The recruits got in different places are very different, one regiment raised in Yorkshire, and recruited in Yorkshire, will get fine stalwart agricultural labourers, while another located in Manchester will get the very opposite style of men, whose morals, principles, and everything else, have been ruined by living in towns. I think localising would never do for this reason in the first place, and besides as certain regiments only can be used in war, while some are in the colonies, these will suffer while the others in India, Canada, and elsewhere will not suffer at all, consequently the whole weight of the suffering of the war would be thrown on certain districts, and so for regular service I think localizing will never do.

The DUKE OF MANCHESTER: I should suggest an alteration in what the honourable gentleman has said. Besides doubling the Militia regiments I should double the Regular battalions, and always have a depôt battalion at home, which should drill the Militia, and form the depôt of the battalion abroad.

A VISITOR: The gentleman who spoke so disparagingly of the Manchester men I think would alter his opinion if he saw the *physique* of the first volunteer regiment in Manchester.

Captain AYLMER: I may explain the word Manchester was only used as a *pour parler*.

The VISITOR: I am very glad to hear it, because you have certainly not seen that regiment.

Major LEVESON: I wish to make a few remarks on localization. There are certainly great advantages which have not been brought to notice, that is to say if a regiment abroad gains certain fame, all the men are individualized at home, and in their villages they are thought more of, and they themselves think a great deal more of being brought to notice in the county where they were born, and where all their friends hear of it. It also has the effect of stimulating their friends to join that regiment, therefore I think in many ways the recruiting might be carried on very advantageously in local districts. I think also with regard to regiments, each regiment might be formed of two battalions. We cannot at all approximate to the Prussian system; our Army must be of an entirely different formation, for this reason, that we have extensive colonies to defend, and a great portion of our Army must be away from England. In fact, the greater bulk of the Regular Army must be for the defence of our widely extended colonies, and that force must be supplied by volunteers. Instead of forcing men into the service we ought to offer certain inducements to make them wish to join the Regular Army abroad. It must not be supposed that the lower classes, or rather men in humbler spheres of life, are destitute of ambition; they like to roam about and travel as much as those who have means, and enlisting in the Army is the only means that they have of seeing foreign countries. It is a great inducement to men to enlist, provided they know they will be taken care of. There are many inducements for them to join the Indian Army; they can marry, and they have a chance of getting on in life which they do not meet with at home. I think our regiments might be very well formed of a line battalion for foreign service when required, and of a reserve battalion to transact all the recruiting, and to pass the men into the line, made soldiers. Then again I should divide the Militia into an Army Militia Reserve, that is to say, men who have enlisted on the understanding that they are to join the Army in time of war, and a second battalion of the Militia to be for home service, the whole four battalions to constitute a regiment. Militia are to all intents and purposes soldiers, but Volunteers we must look upon in entirely a different category. The late French war has shown us this. Men who can disband themselves, who can serve when they choose, and how they choose, whose time is their own, who are dependent upon their labour for their bread, cannot be expected to do the same as paid soldiers, and it is for that reason I think they must always be considered as of a different class, only available for the defence of the country. We must count upon these men for the defence of all our works. I think the greater part of our Volunteers ought to be infantry. Then again, the Army constituted at present being so very few, as compared to Continental armies, the great bulk of it ought to belong to the scientific branches—we ought to have a very large force of artillery, and a considerable force of cavalry. They are the salient angles, the bastions of the work, which we can easily fill up with infantry. They are the branches that take so long to form, and, consequently, their term of service must be longer than that of the ordinary infantry. There is no question about it with regard to infantry that they can very well be formed in six months. I am alluding to the mere use of arms and evolutions that may be required before the enemy. I am not speaking of infantry as it will become by service in the field, but I say that our men are not taught to live as they would have to do in the field. Men that live in barracks and homes are not at all accustomed to camp life. There is the great fault in our organization, that we do not accustom our men to live as they would live in the field before the enemy. Our men are not at home in their tents;

they may be at home in their camps of instruction or drill grounds, but they are not as if they were encamped in front of an enemy. Then, again, with regard to our artillery, we require a very large force of artillery compared to that of other nations, for this reason, that for the whole of our Indian Army, the artillery is furnished from the home Army; we have no native artillery there, and the consequence is we really have a very insufficient force of artillery. In case of war we should require in India alone a very large force of artillery, and as for our artillery in England at present, we talk about having 40,000 men, but certainly our artillery is even smaller in proportion than that; considering that at Königsgratz the Prussians and Austrians brought something like 2,200 guns into action, where should we be if we had to fight a general action with our possibly 60 guns horsed and manned as they are at present? I doubt whether the present arrangement, cutting off one end of the blanket to sew on to the other, makes it any larger. I cannot see that making the garrison artillery into field batteries increases our artillery. If we take the number of guns that we have on our fortifications in England, the number of field guns we have, or ought to have, in the field, we have not really now one efficient artilleryman to one gun. Why should we diminish our garrison artillery, why should we change them into field batteries when we have plenty of men that will make good artillerymen in time? I think this is a subject that requires great attention, that is to say the proper organization and maintenance of the scientific branches of the Army in their full numbers and efficiency. I am sorry I did not see any notice of this paper, or I should like to have gone further into the subject.

Major GEARY, R.A.: I would not have ventured on this occasion to have addressed any observations in the presence of Officers who are so greatly my seniors, but, from reading the newspapers carefully for the last six months, and from what has been said at this meeting, I find that everybody has decided the question of military organization, except the House of Commons. I suppose that will follow as a matter of course. I shall not attempt to go into the whole question of military organization, but merely touch upon those points which pertain to me individually as an artilleryman. Colonel Leahy has proposed that a battery should consist of four guns. That appears to me a sort of expedient rather pertaining to the theoretical than to the practical man, because it has been found from experience in the Peninsula and other places, that six guns is the largest number over which one individual can exercise a personal influence with advantage, and, therefore, I cannot see that it would be attended by any economy to the State to diminish that command from six to four, even although supplemented by a theoretical reserve of four guns, which are to be called upon in some way, which I could not exactly follow out. To return to the question of localization, without going over all the ground which has been so fully treated of by gentlemen here to-night, I will confine myself to it so far as it appertains to the artillery. I think the artillery may be broadly divided into field and garrison, and in their requirements they involve two very opposite things. The more you can knock field artillery about the better they are, but the more you can localize a garrison artillery for the defence of a place, the better. I think we have a very good example before us in the militia artillery of the Channel Islands. These men know every rock, every sounding, every physical feature of the ground, or the water over which they would have to fire. Now, I think if we could allow, out of the regular Army, say as many as two royal artillery gunners for every gun that is mounted in position, then our maritime defences might be entrusted to the artillery militia and volunteer artillery under the superintendence of Officers of the Royal Artillery, each corps being told off to the defences in their own locality. Moreover, the reserve artillery should be confined to the maritime counties. I would make men always work at those particular defences which they would be called upon to defend in case of invasion. I would even carry out the principle so far as this. If it was a very large work like Portsmouth, I would not say such a regiment of volunteers or militia is to garrison Portsmouth, but I would say, "You will go to No. 1 or No. 2 bastion, and there are your guns." I would suggest that when the Militia and Volunteers are called out for training, sudden alarms should be given occasionally, so that at a given signal every man might rush to his place. I am perfectly sure we should find by a proper system of superintendence of the Royal

Artillery Officers, that the greatest *entente cordiale* would spring up between the Royal and the reserve Artillery, and the reserve artilleryman would take as much pride in his gun as the horse artillery man takes in his position as a horse artilleryman. I made one remark which may be taken exception to by some of the gentlemen present, that I would confine the reserve artillery to the maritime counties. It is for this reason, I think it would be time and training thrown away to get up field batteries and horse artillery, as we have seen done in some places. It must take time to form an efficient field artillery. You must have horses and harness, and they cannot be called out for training for a month or two months in the year. The horses must be always in training, they must be always groomed, and their harness must always be kept in proper repair. Therefore, I think that work properly pertains to the regular artilleryman. But I believe if we were to have a properly organized system of militia and volunteer artillery for the maritime defences, so that in case of one of these sudden invasion panics, that occur about every three years we know every gun mounted on the defences round England and Ireland had its quota of militia and volunteer artillerymen ready to come and work it under proper superintendence of regularly trained Officers, that it would go a great way towards giving us a feeling of confidence. As for the large question of battalions of reserves, I leave that to the general Officers here present, who are far better able to deal with that subject than I am.

Captain HEATHORN, h.-p., R.A.: Allow me to say a few words straight to the point upon clause 5.

"Each military district to be provided with the nucleus of a complete staff for "an army corps, one or more divisions of regular troops complete in all arms and "requirements for active service to be quartered in each military district." We want more than the nucleus of a complete staff. *We want the nucleus of a complete material fit-out* in each division.

In all our military districts there are numerous Volunteers who, though intelligent, useful, and most excellent in their way, cannot be counted on exactly as regular forces, for soldiers are made more by discipline than by drill.

Three things make a soldier: drill, discipline, and the use of the material belonging to his arm of the service.

On the latter consideration we ought to have in each division an organization of skeleton equipments, perfect in every thing but men, commanded by and intrusted to a field Officer, assisted by two or three subaltern instructors, with a few serjeants, and handy men for the instruction of volunteer Officers and privates. These field batteries, batteries of position, cavalry troops, pioneers, engineering and pontoon trains, tent and cooking equipments, &c., complete in all material, would be all absolute worth; always ready and efficient if wanted for active service, only requiring manning; they should go about from place to place and furnish instruction to Volunters.

Volunteer chiefs, as soon as competent, should have charge and command on parade, until the time allotted for instruction in the locality finished, and the skeleton train moved off to give others a help on. This would be a great element of success.

Thus, a battery goes to a certain place. Volunteers would learn that it was composed of horses and material, the former to be shod, groomed, cared for, harnessed, looked after, and taught, according to a system. That each part of the harness had a definite use, and required fitting and adjusting accordingly; that the easiest draft of guns and waggons was subject to certain rules. They would learn to ride, to drive, hook in, and unhook their teams, mount, dismount, pack, and unpack their batteries; take their guns and carriages to pieces for water transport, and in a few minutes put them together again.

In a like manner pioneers would soon be up in the passing of obstacles, formation of attacks, loopholes, construction of obstacles, and destruction of cover; riding men would learn the use of cavalry weapons. Volunteer sappers would build a pontoon bridge, construct works, or drive mines, in emulation of the regulars, and all would soon be as well up in carrying, tent-pitching, and field-cooking as would be necessary for real work.

Volunteers would flock in for instruction such as this, for every Englishman is curious to learn; every volunteer will attend something new to be acquired.

When the skeleton troop or train had finished its allotted time in one locality, it should move off to its next station, so on, round and round the division. Strategy would dictate the best positions for the development of certain arms of the service. Towns and cities would have their sappers, the coast would furnish garrison artillerymen, riding troops, from our young farmers, who could not afford to enter the yeomanry, into our cavalry of reserve (helping the yeomanry itself if required), and each arm of the Volunteer army would have its legitimate development.

I bring these points forward as practical suggestions. Volunteers cannot spare time for much camp residence, therefore send them camp experience at home, get them as well up as possible in camp life and the use of material, and get a few field days out of them when you can.

Major WETHERED: I ought to apologise for intruding any remarks on a subject which I have not fully considered. I am certain if England should unhappily be drawn into a European war, that we must be prepared to act on the offensive. England, less than any other nation, can afford to carry on a defensive war. By so doing we should invite invasion and the destruction of our commerce. Neither can we depend upon our Fleet for the protection of our own shores. If our Fleet is to render efficient service, it must be free to come and go, to keep open the highway for our commerce, and to sweep the seas of every enemy's ship. Therefore, looking upon the question in that view, I think we must be prepared to carry on an offensive, as well as a defensive war, in other words, to strike with all our force, instead of waiting for the enemy's blow. I do not see how we can possibly succeed unless it be on some such plan as the lecturer proposes. If we are to have a large and an efficient Army, prepared at any moment to take the field for any purpose, we must have that Army a regular paid efficient force. We cannot call out our Militia and Volunteers and send out 100,000 or 200,000 to take the field away from our own shores. Therefore, to have a sufficient and an efficient force in reserve we must necessarily resort to short service, and by that means raise a home reserve of trained soldiers ready to swell the ranks of the regular Army. But that process, of course, will take some years to elaborate. If I mistake not the times are pressing. We have all been rather staggered at the overwhelming forces which have been thrown suddenly into the recent conflict. There has been a great deal of talking and writing, but I do not see that we have advanced one single step towards placing this country in a state of preparation even for defence. One previous speaker remarked that "we ought first to catch our hare." I consider that we have caught a pretty good hare already, but the cook has failed in his duty, and if we wait much longer we may catch a Tartar. When I look at that table of figures I see that we have some 400,000 men who have come forward voluntarily for the defence of their country. Is it not essential to make immediate use of the material at hand? Can we not without delay raise these men to the greatest state of efficiency? Why not call out our Militia for six months' training? It is a mere matter of money, nothing more. We should thereby create a source for supplying our Regular Army with trained soldiers. With regard to the Volunteers, as well as the Militia, they want more encouragement and greater inducements to attain efficiency. We have done very little for them. We have grudged every shilling laid out upon those forces. Let us now do what we can to raise these men to a state of efficiency; having done that we can sit down and talk calmly over our future plans. I am afraid that under the pressure of the times, the House of Commons will be induced to pass some measure that may prove injurious to the country. I should be very sorry to see Englishmen coerced into the service when they are ready to volunteer and be drilled for their country's defence. There is no occasion for that, for I am sure if we treat men properly we shall have volunteers enough to raise all the forces we need. At present our men are discharged in a way not at all calculated to bring them back into the service. These matters are not left enough in the hands of military men, consequently the feelings and views of soldiers are not considered. A certain reduction is ordered, and so many hundreds or thousands are struck out of the Estimates. The officials at the War Office, accustomed to these reductions, gather together and consult. With

them it is a matter of mere clerk-like proceeding. So many men represent so many pounds, and a large number of effective men are at once struck off the strength of the different regiments. These men are often dismissed long before the expiration of their term of engagement, and in a very inconsiderate manner, without due preparation for such an emergency, and at a season of the year when employment is difficult to be found. Some of these men, who had enlisted for a term of ten years, after having served about eight years abroad, returned to England from various causes, and naturally looked forward to completing the unexpired portion of their service at home, with the option of re-engaging within the last six months of the period of their term of service, and receiving a bounty, agreeably with the conditions existing at the time they enlisted, but when the last reductions took place these men were suddenly required either to re-engage at once, eighteen months or two years before the expiration of their engagement, under the altered condition of loss of bounty, or to be dismissed forthwith. The regulations existing when these men enlisted sanctioned the payment of 20*s.* on discharge, and this sum is still continued to the men who re-engage in lieu of the allowance they were supposed to be entitled to on discharge, but the men who were discharged, as above described, and all others taking their discharge on completion of their ten years' term, are sent away with only 5*s.* in their pockets, often having to beg their way: such treatment is not calculated to encourage enlistment, as these men go about the country giving to all with whom they come in contact, a very unfavourable impression of military service. I would say a few words about organization; that is a very large subject. As our regiments are at present constituted I cannot see the advantage of county localization. There are very few regiments that have any distinct locality. Men enlist from all parts of the kingdom and very often to get away from those localities in which they live, and with no desire to return. Therefore, it would not appear desirable to localize regiments as at present constituted. In course of time we might identify certain regiments with certain localities, by raising the men as far as possible from those localities. I do not see why regiments both at home and abroad should not have reserve depôts connected with certain districts, placed under the instruction of a thoroughly competent staff; such establishments might form a nucleus for the Militia and Volunteers of the district. By that means in process of time you might identify certain regiments with certain districts and home reserves of Militia. But at present we are not prepared for that. When we try to carry out any scheme we generally break down in detail. Take the case of depôt battalions, the idea was very good, they were established as schools for uniform instruction, but they broke down because the system was not carried out in detail. A depôt battalion was composed of the depôts of about eight different regiments concentrated under one staff, where recruits for these different regiments were drilled and instructed. Of course, if you sent your sons to any particular college you would take care to ascertain that a good and efficient staff of professors and instructors were employed, so that they might be properly educated for their profession. With these depôt battalions there was no proper provision made to secure efficient drill and instruction. And when you descended to the non-commissioned staff, instead of finding a *corps* of trained men, the very reverse was the case. The custom was, when a regiment was ordered to embark, all the good and efficient non-commissioned officers and men were selected for service with the head-quarters, leaving with the depôts the mere refuse, men, in fact, unfit to proceed with the regiment; then out of this beautiful refuse the Colonel commanding the depôt battalion had to pick out his drill instructors, and non-commissioned staff to instruct the whole of the recruits for the regiment. By such a system it was simply impracticable to educate or drill men efficiently. We take, perhaps, from six to nine months to drill a recruit, why is it? Because the recruit does not get facilities for drill. Go to our large camps, and you will find in a climate like ours, perhaps for one-third of the year, the men cannot undergo their drill, there is no drill shed. It is a most painful thing in the winter to see the men standing out in the midst of the coldest frost handling their fire-locks, and going through their ordinary drill, as if it were open summer weather. All these things require to be considered, and if attended to, it would improve the Army very much. Take again the simple thing of clothing. We think more of appearances than anything else. I

will say nothing about the construction of the clothing, because any one can see that the men are not clothed for service, but for show. Look at the way in which they put on their clothing.

The CHAIRMAN: That hardly comes within the compass of this paper.

Major WETHERED: I wanted to remark that our soldiers, as a consequence of being supplied with their new clothing on the 1st of April, for the sake of appearance at the spring reviews, were literally more warmly clothed in summer than in winter. But as you have ruled that the subject does not come within the paper, I will sit down.

On the motion of General Sir William Codrington the meeting was adjourned to Wednesday evening, February 22nd.

Ebening Meeting.

Wednesday, February 22nd, 1871.

LIEUTENANT-GENERAL THE HON. SIR JAMES LINDSAY, K.C.M.G., in the Chair.

(*Adjourned Discussion on Lieutenant-Colonel Leahy's Paper.*)

OBSERVATIONS ON THE POINTS OF DIFFERENCE BETWEEN THE PROPOSITIONS SUBMITTED FOR DISCUSSION AT THE MEETING ON THE 14TH FEBRUARY, 1871, AND THE SCHEME EXPLAINED IN MR. CARDWELL'S SPEECH ON THE 16TH FEBRUARY, 1871.

The CHAIRMAN: Gentlemen, you will recollect that this meeting was adjourned at a late hour upon the last occasion. Colonel Leahy has taken a certain number of men, say 100,000, in the regular Army, from 120,000 to 160,000 Militia, and about 150,000 Volunteers, besides a certain number of men of the Army reserve, and, having got them, asks how you can best organize them into an effective Army under such a system as will make that Army powerful for the defence of the country and available for foreign service. Circumstances have altered since we last met here. You have now the Government scheme before you which takes in a good many of the principles that Colonel Leahy enunciated, and which have been before the public for several years, and you have the opportunity of discussing whether the principles enunciated by the Government are, in your opinion, favourable or not to the development of the resources of this country. Colonel Leahy feeling that the circumstances are somewhat altered since the last debate, has drawn up a *précis* of these points, and in what way they bear upon his paper. He will first of all read that to you, and then we will proceed to discuss the subject.

Lieutenant-Colonel LEAHY: I would premise my observations by stating that there is the most complete agreement between the principle enunciated by Mr. Cardwell, namely, that "short service is at the very

root of all Army Reform," and that on which the proposals in my original papers were based; and that the object in view, namely, to "give greater elasticity to short service," is that with which the details I submit for discussion were worked out.

I also adopted "attenuated battalions of about 500 men," with the necessary reserves, as the basis of the proposals for the "Reorganization of the infantry forces," which were submitted for consideration in 1867–8.

The Government scheme as set forth in Mr. Cardwell's speech was summed up under thirteen heads, as follow:—

1. No increase of the standing Army beyond that which was made at the end of last session.
2. To raise the Army Reserve as rapidly and largely as possible by short service in the Army.
3. To pass as many men through the ranks as can be done, having regard to the number of recruits and the time required to make a man an efficient soldier.
4. To increase the Militia: to organize the Volunteers; and to provide for compulsory service in cases of emergency.
5. To abolish purchase.
6. To withdraw from Lords Lieutenant the power they have now in regard to the auxiliary forces (retaining their recommendation for first commissions).
7. To combine the whole military forces of the country under General Officers, to appoint Colonels on the staff in sufficient numbers to this Army.
8. To combine recruiting for the Line with that of the command of Reserves.
9. To fuse together the Regular and Reserve forces by appointing Officers of the Regular Army to positions in the Reserve, and by giving subalterns in the Militia, commissions in the Line.
10. To brigade them together.
11. To find field artillery for all arms.
12. To enable counties to get rid of the inconvenience of billets.
13. To gain command of the railway communication of the country, in case of emergency.

"In short, to unite all the voluntary forces of the country into one "defensive Army, with power to supplement by compulsion in cases of "emergency—all to be under the command of the General Officers "commanding in districts, subordinate to one Commander-in-Chief, who "will act with the approval of the Secretary of State; and thus to "place the whole under the direction and supreme control of Her "Majesty's responsible Ministers."

It will be observed by those who are conversant with the papers under discussion, that there is no disagreement between the propositions before this Institution and eleven out of the thirteen proposals.

I doubt, however, whether the application of the short service principle, as proposed to be immediately carried out, is as general and decided as

necessary, and whether the number of mounted cavalry soldiers and of field guns is sufficient in proportion to the number of infantry.

Of the remaining points, one, namely, purchase, is excluded from the present discussion.

I would especially invite discussion on the proposed "district" and "localized," as compared with a "regimental" and "non-localized" organization for recruiting, training, and commanding the Army and Reserves.

I feel convinced that an expansion of the "regimental" organization suitable to the new principle of "short service" is a necessary condition to obtaining a really "efficient," "elastic," and "economical" military force.

On the question of relative "efficiency," I speak on the authority of competent military men, but there are many in this room who are well qualified to give an opinion on the subject, and who will, I hope do so.

As regards "elasticity," I would refer to tables (Appendix A) prepared since the last meeting, which show how readily the composition of the regular regiments may be adapted to meet the present distribution of battalions; which, owing to the withdrawal of troops from certain colonies, differs materially from the distribution worked out in 1867–8.

I would propose to fix absolutely and finally the regimental "*establishments*," and if the system be properly carried out there would be no change in the number of Officers and men borne on the regimental rolls.

The changes which so frequently take place in the policy which regulates the amount of the Army Votes, changes which I believe must be contemplated and provided for in any new scheme for reorganization, may cause a variation in the number of men "under the Colours" and "in Reserve" respectively, and a corresponding variation in the amounts to be voted for, and possibly in the efficiency of, the total military force, but the "establishment" of each regiment would remain constant.

The relative cost of the existing and proposed arrangements is approximately given in a statement (Appendix B), in which the present and proposed numbers of infantry of the line "at home," "abroad," and in "India," together with the relative estimated cost per man are given. The present numbers have been extracted from the Estimates (1871–2).

If this statement be correct, it will be possible, without any material change in the number of men constantly present with the several infantry battalions, to increase the regimental establishments by 54,000 men, or nearly 50 per cent., and yet effect an eventual saving of annual expenditure.

Any saving which might immediately accrue would be well applied

in procuring the retirement, to the Militia and Garrison Reserves, of the 40,000 soldiers who re-engaged during 1867–8.

On the question of "localization" of regiments, I beg, in reference to the remarks at the last discussion, to offer the following explanation:—

The system of "localization" to a general adoption of which for our "regular" forces, objection is raised, is the system that is in force in Prussia, and which is a desirable adjunct to a system of general "conscription."

Under that system the regiment is usually quartered in the district in which the men comprising it are conscripted, the object being to lighten the tax of enforced personal service.

I do not believe it will either be necessary, "desirable, or expedient"* to adopt this system of localization for our regular voluntary forces, and as this was the opinion at which the Royal Commissioners of 1866 arrived after having "examined various witnesses," I claim the support of the distinguished Statesmen and Officers who signed that Report to the proposition of "non-localization" but "*local connections.*"

The localization of the Royal Marines is not "localization" in the proper sense of the word, as the recruits are not raised solely in the district in which the head-quarters are situate.

With regard to the Militia, a point which I submit may be properly discussed at this Institution is the period for which the Militia "recruits" should be continuously trained. The period proposed is four to six months, and it is a question whether or not this is sufficient.

Much will depend on the class of recruits, and on their previous training and education.

With a system of drill in all State and rate-aided schools, probably much may be done in the way of "drill" during four months.

Apropos of the question of time for training recruits, the meeting may be interested to know the time actually taken in training engineer soldiers. About 400 recruits are annually trained at Chatham to fill up the ranks of a corps of over 4,000 men.

This is about double the number that each of the two battalion regiments that I propose would have to train.

The time supposed to be allowed for the purely military training of an engineer recruit is thirteen months, of which four months is supposed to be entirely occupied in drill, and nine months in the instructional course of field works.

As a matter of fact this time is exceeded owing to sickness and days devoted to military duties, &c.

The average number of working days actually devoted to instructional purposes are as follow:—

* See Extract from Report of Royal Commission, page 8.

Drill, about	130 days
Field works	170 „

In addition to this purely military training, the recruits attend one or more of the special schools, viz.:—

Drawing school	135 days
Architectural school..	120 „
Survey	180 „
Telegraphy	130 „
Photography	90 „
Chemistry	25 „

A new course of instruction in the use of and practice in laying torpedoes has recently been added, and this course will probably require 120 working days,

It will of course be understood that every sapper does not go through the whole of the special school courses, but we can, in the corps of Engineers, find, by selection, Officers and men who have devoted more or less attention to each of the subjects for which there is a special course of instruction at the School of Military Engineering.

Indeed there is reason to believe that a proportion of men who purchase their discharge from the corps of Engineers enlist for the special object of procuring, without expense, the training and educational advantages which are open to every young soldier who joins the corps.

I must take this opportunity of stating that the corps of Engineers is much indebted to Mr. Cardwell for being so ready to recognize the advantage which ought to result to the public service from the useful employment of Engineer Officers and soldiers in time of peace.

Soon after he came into office, he lent an entire company of Engineers to the Post Office authorities for employment, under the Civil Staff of that department, or the Telegraph Service of the State.

There is another detail in Mr. Cardwell's scheme to which I venture, to take exception; that is the proposal to grant commissions in the Line to Officers of the Militia.

I understand the chief object of this proposal to be to keep up connection between the Militia and the Line, but this most desirable result would, I submit, be obtained more effectually by reversing the process, and giving the preference for commissions in the Militia to those who who had served in the regular Army.

The object of keeping up local connections could thus be combined with the more important one of providing efficient officers for the Militia, and the not less important one of giving the county authorities some voice in officering their local forces.

I submit that these objects would be obtained in a simple and effectual manner by giving, within certain limits of number and qualifications, or if necessary competition, commissions for limited periods in the Line

or Cavalry, to the sons of county gentlemen, to be named by the Lord Lieutenant, with the understanding that these gentlemen shall, on the expiry of their period of service in the regular Army, have (if reported to be duly qualified) a preference for commissions in the Militia or Yeomanry.

Under the present regulations for purchase, of 100 officers who join the Army, 44 retire by sale of their commissions before they obtain the grade of Captain, *i.e.*, within 10 years' service. An additional number of 30 (or 74 in all) either sell out or retire from the grades of Captain and Field Officer; notwithstanding this outlet for about three-fourths the whole number who enter, the superior Officers of the regular Army are too numerous, and, as a rule, too old.

The arrangements I advocate would help to remove this inconvenience, especially if combined with regulations by which commissions in the several grades of Militia and Yeomanry shall only be held within proper limits of age.

I now pass to the question of "military districts" and "annual manœuvres."

Under these heads I would observe that, so far as can be gathered from the Estimates of 1871–72, we are likely to fall short of our "military" and "technical" requirements.

I submit that the proposal to appoint selected "Colonels" to administer and command the regular regiments would facilitate a system of organization and of manœuvres by "Brigades."

Each "Colonel" of a regiment could, in addition to training and commanding his own corps, supervise the training of three battalions of Reserve forces (say 4,000 men in all).

He would during the annual manœuvres, command a brigade composed usually of Officers and men trained under his immediate supervision. The "Colonel" would be assisted by a temporary Staff of Officers who had qualified at the Staff College, and who should be, so far as possible, selected from Officers of the corps, regular and reserve, under his command.

Under this arrangement we should arrive at a really comprehensive system of organization and manœuvring by brigades, and the reserve forces would have the advantage of the supervision, not only of Generals commanding districts and Brigadiers, but also of some 120 to 130 selected Regimental Commanders.

I submit that this would be a more efficient and economical system of supervising the recruiting and training of our military forces than a system of "localization" by "sub-districts," and the appointment of additional "Colonels on the Staff," each having under him the whole recruiting service of his district, and the command of from 15,000 to 20,000 Reserve troops.

A table is annexed (Appendix C), in which the numbers of "Our Military Forces," as proposed in the Estimates 1871–2, and those to which I would propose to work up, are shown.

It is believed that the revised proportions of infantry troops could be arrived at during the current year, by the following arrangements:—

Regular Infantry (Estimates 1871-72)		69,000	
First Army Reserve ditto		9,000	
Available Infantry		78,000	
Add—By ordinary Recruiting.....	*20,000*		
**Militia Reserve* (1867)	*20,000*		
	40,000		
†*Deduct—Non-Commissioned Officers and Men to be transferred to Militia and Garrison Reserves*	*12,000*		
Net addition		28,000	
Revised proportion of Regular Infantry—			
Under the colours....	58,000		
Army Reserves.....	48,000		
Total Regular Infantry			106,000
Militia Infantry (Estimates 1871-72)		123,000	
Second Army Reserve ditto		30,000	
		153,000	
†*Add—Transfers from Regular Infantry*.....	*12,000*		
By Recruiting, say	*25,000*		
	37,000		
**Deduct—Militia Reserve*, 1867	*20,000*		
Net Addition.....		17,000	
Revised proportion of Militia Infantry—			
Militia Field Battalions	85,000		
Garrison Troops.....	85,000		
Total Militia and Garrison Battalions			170,000
Grand Total Infantry Forces			276,000

(APPENDIX A.)

INFANTRY OF THE LINE.

Comparative Statement of Present and Proposed Regimental Establishments.

(*Adapted to the Army Estimates*, 1871–72.)

			Battalions.	Field Officers.	Captains.	Subalterns.	Total Officers.	Reserve Officers.	Administrative. Officers.	Administrative. N.-C.O's.	Sergeants.	Corporals.	Privates and Drummers.	Total Non-commissioned Officers and Men.	Reserves.	War Establishment.
Regimental Establishments. 1871–72.	1st Foot. Battalion in India.	Home .	1	3	12	17	32		2	6	52	48	676			
		India . .	1	3	8	17	28		2	5	44	40	796			
		Total . .	2	6	20	34	60		4	11	96	88	1472	1656	..	2000
	13th Foot. Battalion abroad.	Home .	1	3	12	17	32		2	6	52	48	652			
		Abroad	1	3	8	17	28		2	6	36	40	510			
		Total . .	2	6	20	34	60		4	12	88	88	1162	1338	..	2000
Proposed Regimental Establishments.	Regiment with Battalion in India.	Home .	1	1 { 2	8	13	24	7	2	5	36	32	448	..	484	
		India . .	1	1 { 2	8	17	27	2	2	5	36	32	816	..	116	
		Total . .	2	5	16	30	51	9	4	10	72	64	1264	1400	600	2000
	Regiment with Battalion Abroad.	Home .	1	1 { 2	8	13	24	7	2	5	36	32	448	..	484	
		Abroad	1	1 { 2	8	17	27	2	2	5	36	32	528	..	404	
		Total . .	2	5	16	30	51	9	4	10	72	64	976	1112	888	2000

(APPENDIX B.)

ABSTRACT and Comparative Statement of Cost of Present and Proposed Regimental Establishments.

Present Establishments.

	Home.	Abroad.	India.	Total.	Average rate per head.	Cost.
Battalions	69	22	50	141	£	£.
Officers	2,838	616	1,441	4,895	200	979,000
Sergeants and Corporals	6,848	1,736	4,200	12,784	65	830,960
				3,946 at	40	157,840
				40,000 at	45	1,800,000
				64,000 at	50	3,050,000
Privates and Drummers	51,740	13,406	39,800	104,946	Total cost	6,817,800
Total Non-Commissioned Officers and Men				117,730		

Proposed Establishments.

Battalions	100	22	50	172		
					£	
Officers	2,400	594	1,350	4,344	200	868,800
Reserve Officers	844		..	844	100	84,400
Serjeants and Corporals	6,800	1,496	3,400	11,696	65	760,240
				44,800 at	40	1,792,400
				52,416 at	45	2,358,720
Privates and Drummers	44,800	11,616	40,800	97,216		
Reserves for Battalions. Home 48,400		..	..			
Abroad 8,888	63,088	..	..	63,088	10	630,880
India 5,800		..	..			
	114,688					
Total Non-Commissioned Officers and Men				172,000	Total cost	6,515,440

Additional Non-Commissioned Officers and Men on proposed Establishments	54,270	Saving of Expenditure on proposed Establishments	£301,360

APPENDIX C.—OUR MILITARY FORCES.*

	Infantry.		Cavalry.		Field Artillery.		Garrison Artillery.		Engineers, Control, &c.		Totals.	
	1871-72.	Proposed.	1871-72.	Proposed.	1871-72.	Proposed.	1871-72.	Proposed.	1871-72.	Proposed.	1871-72.	Proposed.
Regular Troops, including Depôts	69,000	58,000	13,000 (7,750 horses)	13,000	9,000 (408 guns, 5,959 horses)	9,000	10,000	10,000	7,000 (1,500 horses)	7,000	108,000	97,000
1st Reserve.....	9,000	48,000	.. ..	9,000	.. ..	9,000 (264 guns, 3,441 horses)	.. ..	5,000	.. ..	2,000	9,000	73,000
	78,000	106,000									117,000	170,000
Militia and.....	123,000	170,000	.. ..	.. ..	.. ..	.. ..	16,000	25,000	.. ..	5,000	139,000	200,000
2nd Reserve.....	30,000										30,000	
	231,000	276,000	13,000 (7,750 horses)	22,000 (20,000 horses)	9,000 (408 guns, 6,959 horses)	18,000 (672 guns, 9,400 horses)	26,000	40,000	7,000	14,000	286,000	370,000†
Garrisons abroad; including Reserves and Colonial corps	22,000	24,000	.. ..	.. ..	.. ..	.. ..	4,000	4,000	1,000	2,000	27,000	30,000
Totals	253,000	300,000	13,000	22,000	9,000	18,000	30,000	44,000	8,000	16,000	313,000	400,000
Yeomanry.....	.. ..	.. ..	14,000	20,000	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	14,000	20,000
Volunteers	130,000	140,000	.. ..	.. ..	.. ..	.. ..	34,000	34,000	6,000	6,000	170,000	180,000
Totals	383,000	440,000	27,000	42,000	9,000	18,000	64,000	78,000	14,000	22,000	497,0 00	600,000
Regular forces in India, including Reserves	46,000	51,000	Present Numbers .. .. 17,000 Proposed „ 19,000								63,000	70,000

* Round numbers only given.

† 250,000 field forces, 120,000 garrison troops.

Sir HARRY VERNEY, Bart., M.P.: I think, Sir, that one thing which every military man will rejoice at, is the testimony borne to the merits of His Royal Highness the Duke of Cambridge, in the House of Commons last night. I never remember any debate conducted in a way so entirely on one side. The opinion of all who spoke was that there was no man in the Army so well acquainted with details, and so fit for the office which he occupies, as the present Commander-in-Chief. I regretted that Mr. Cardwell omitted to touch upon one subject insisted on by Colonel Leahy, namely, the advantage of dividing the country into districts. One of the great difficulties urged was that of selecting Officers. If districts are made use of for testing the ability of Officers, that difficulty will in great measure cease to exist. How is it that the Prussian Army is so remarkably well officered? It is that their country is divided into districts, to each of which belongs a *corps d'armée*, which meets every year to practice the manœuvres required in war. A *corps d'armée* of 10,000 or 20,000 men is ordered to manœuvre over one part of the country against another army of 10,000 or 20,000, and any one who has seen those manœuvres carried out will be aware that they are done in the way most calculated to test the efficiency of Officers, and really to inform the heads of the Army who are the fittest men to be put in command. It is one advantage that the Navy has over the Army, that being always at war with the elements, it is seen who can best sail a ship and manœuvre a fleet; whereas until an Army is in the field, it cannot be known who has the military talent necessary to command large bodies of men. Therefore I most urgently request all gentlemen who have any influence, to exert it in carrying out that portion of the scheme of Colonel Leahy which refers to the division of the country into districts, where portions of the Army should be exercised in this manner. I much lament the great diminution of those open spaces, on which large bodies of men can be manœuvred, and there is one particular district to which I would call the attention of the meeting, namely, the New Forest, than which I do not believe that there can be any more fitted for this purpose, and the consequent training of Officers for command. If the New Forest is cut up and enclosed, it will deprive the Army of the very best exercising ground in England. If two *corps d'armée* were brought into the New Forest, and camped there during the summer, they might practice in the way best calculated to test the ability of soldiers, and furnish information to assist the Commander-in-Chief in his task of selection. There was one other point to which the gallant gentleman referred, which I have always advocated, namely, drill in every school supported in any way by the Government or country. I cannot see the smallest objection to this, and do not believe any master of a school would object. I endeavoured to persuade the Government, when Mr. Forster's Bill was under consideration, to introduce a clause to the effect, that in every Government or rate-aided school the boys should be drilled. It would greatly facilitate their entrance into the Army afterwards; would give a taste for it, and bring in some valuable recruits. Why is it that the *personnel* of the Navy is at this moment so remarkably good, and I believe it is an observation universally made by naval men that it was never better than at the present moment. It is because it is greatly composed of boys, brought up to be sailors in the "Caledonia" and other training ships. Why should not we have the same thing in the Army; first that boys should be drilled in schools, which would give to some a military taste, and next that they should be educated for the Army as they are for the Navy? Another point much insisted on by Colonel Leahy is one to which I have for a long time endeavoured to call the attention of the Government, viz., that every small appointment and duty that can be as well performed by a sailor or soldier as by a civilian, should be given to those who have served their country. It is important when a man goes into these services that he should know that if he performs his duty well, and leaves with a good character, he will obtain one of those little positions which make a man comfortable for life. There is no change which would be more likely to bring in eligible recruits. I recollect when my father was Governor of Chelsea Hospital, that the porter of the hospital died. He said to the Government, "I have only one favour to ask: let us have a soldier for the post." But the Paymaster-General said, "Oh, no; that is my private patronage." He wanted to provide for his butler, and gave him the situation. Now this kind of thing is a great discouragement to men. It was only a few years ago that our parks were all taken

care of and policed by old soldiers. It is said there is good reason for putting the metropolitan parks under the metropolitan police; it is a difficult duty, perhaps best performed by such an efficient and valuable body of men, and may be necessary in the heart of London. But the other day I was in Kew Gardens, and there, too, I found my old friends the old soldiers supplanted by the police. I think that is extremely to be regretted, and wherever old soldiers or sailors can do the duty as well as other men, such as office messengers, porters, housekeepers, &c., I hope the Government of the day may be willing to employ them. I have long believed that short service for a portion of the men would be valuable both to the Army and the country. If a large number of men were passed through the Army, and afterwards were allowed to enlist voluntarily in the Reserve, I do not believe it would be at all necessary to have any compulsory service; I would only keep those who desire it, and make remaining in the Army a reward to the good soldier, who would then have some prospect of these civil appointments. None should be allowed to remain in the ranks except those who conduct themselves perfectly well, and in a very short time this would be esteemed a boon, and the greatest punishment would be to expel a man. It was said the other evening that the Horse Guards were always opposed to the discharge of bad soldiers. I hope this is not the case. It would be the most foolish policy in the world. To get rid of your bad men is the way to raise the character of the service. I believe this is an opportunity which the Government of the country ought to take to render our Army thoroughly efficient, and composed of the best men of the nation. It is the first time within my recollection that there has been such a strong feeling in favour of a thorough reform. Whether there is really any reason for anticipating danger of invasion I won't say; my own opinion is that there is none. But Government must place our Army on such an efficient footing that, supposing we were called upon for any great national effort, we might be able to do so with facility. I conclude as I began, by saying that the district system, and the plan of rendering each *corps d'armée* in the district a separate Army, containing within itself all the materials of service, all that is necessary for perfect efficiency, and raising emulation between the different Officers who command those districts and the Officers under them, will, I believe, be the way to assist the Commander-in-Chief in that which was said to be his greatest possible difficulty, the selection of Officers.

Lieut.-Colonel FLETCHER: Sir James Lindsay and Gentlemen,—I feel considerable diffidence in venturing to criticise the scheme so ably brought before the meeting by Colonel Leahy, and still more in saying anything with reference to the plan which has been enunciated by Mr. Cardwell. There is, however, one defect which I cannot help thinking exists in both plans, namely, that while there are schemes proposed for organizing our military forces, so as at some future time to place the country in a position more in accordance with its reputation and power, no plan has been put before either this meeting or the House of Commons for preparing an army in case we should be called upon to take the field next summer or the following year. All the suggestions have reference to the future; in the meanwhile we might be attacked suddenly, with only a fortnight's notice, and I think hardly any one in this room will say that we have any sufficient force to put into the field, either to resist invasion in England, or to send an army to Belgium, in case we should be obliged to do so. Therefore I would propose that whilst schemes for Army reform are being licked into shape, a certain number of regiments of Militia should be embodied at once—that those regiments should be kept under training for such a time as will make them tolerably efficient soldiers, say for six months, and at the end of that time, volunteers should be called from them for the Army of Reserve. We should then have men who, having passed through a certain amount of training, would return to their ordinary occupations, and form the Army of Reserve, whilst those who had volunteered from the embodied Militia to form the reserve of the regular force, would be ready at a moment's notice to fill up the ranks of the skeleton regiments which Mr. Cardwell advocates. To pass to another portion of the scheme which Mr. Cardwell has brought before the House of Commons. He bases his scheme of Army Reserves upon short enlistments, and he has done nothing to connect the regular Army with the Militia. He still leaves the recruiting serjeant

of the regular Army and the recruiting serjeant of the Militia to go into the same market for men. There will still be the same confusion that existed during the Crimean war, and during the Indian mutiny, when both recruiting serjeants went into the same market and bid against each other. Mr. Cardwell believes that by enlisting men for short service, *i.e.*, for six years, he will obtain a sufficient number of men to pass through the Army, and to form the Army Reserves. But it is a fact that the men at present will not enlist for short service. It is well known that in many corps, for instance, the Guards, not above one in ten have engaged for the shorter period. Therefore, unless short service be made compulsory, instead of voluntary, judging by results at present obtained, the short service men will not be recruited. If it be made compulsory, and enlistment be limited to six years, a very much larger number of recruits will be needed every year. Mr. Cardwell has taken great credit to himself for getting 20,000 men when he settled to augment the Army, but it must always be remembered that immediately the Army is to be increased, the standard is lowered, which occasions a rush of men who have been waiting to come into the Army, but have been prevented because they were not of sufficient height. Therefore it does not at all follow that the scale of recruiting of the past six months will be kept up, and there is no proof whatever that if the period of enlistment be made six years, a sufficient number of recruits will be obtained. I must, with all due deference, venture to disagree with the scheme Mr. Cardwell has put forward, and to regret that he has not brought into more intimate connection the regular Army and the Militia, making the Militia the nucleus for recruiting for the regular Army. But at the same time I must repeat that above all, the country ought at once to be put in a proper state of defence, giving time for maturing whatever schemes may ultimately be adopted.

Colonel EVELYN, Commandant 1st Royal Surrey Militia: I shall, perhaps, in the few remarks I intend to offer, deal more with generalities than I should have done if I had had the advantage of hearing the previous discussion. There is is no doubt that the efficiency of the military organization of a country depends upon two principal elements—its strength during war, and its cheapness during peace. However strong a nation may be during war, it will certainly exhaust its resources if it keeps up the same forces during peace, and therefore, as Colonel Leahy justly observed, elasticity should be the main characteristic of any good military organization. Now elasticity, that is particularly to be observed in the Prussian and Swiss systems, but I regret to say it is remarkable only by its absence in ours. Nor do I see the element of elasticity in the plan that has lately been brought before the Parliament of this country. I heard we were all to be organized for defence, so that the nation, as nations always do now during war, should be able to put forward its utmost force during war, and still that the resources of the country should not be exhausted during peace by vast military establishments. But what do we find? An increase of nine thousand men to the Army, and of three millions to the Estimates, and an enormous sum to defray the cost of a very good measure, but a measure that was not particularly pressing, to do away with purchase in the Army. It has often been said that our military organization extends to regiments, and so far it is perfect, but that beyond that it does not exist. Now I must venture to remark that in my humble opinion our military organization does not mount so high as regiments. We have nothing but battalions, and those regiments that are said to have two battalions, or the Grenadier Guards, with three battalions, or the Rifle Brigade and 60th Rifles, with four battalions, are in point of fact composed of separate and distinct regiments of one battalion each. I think the gentlemen who I see around me are so well acquainted with military subjects, and so many of them have studied the composition of foreign armies, that I need hardly say that a one-battalion-regiment of the Line is almost unknown except in this country. I believe in all the principal armies of Europe the regiments of the Line have three battalions; with us they are composed of one. I think the simple plan of increasing our elasticity would be to make each of our regiments into two battalions, for I maintain that an increase of our forces for war should not be gained by raising battalions, squadrons, batteries, or even companies, but by increasing the number of the establishment of those already

organized. It is only my individual opinion, and perhaps I may be wrong, but it appears to me that the nucleus of every battery, of every squadron, and of every company should exist in time of peace, and be capable of enormous extension on any sudden call for war. It is rather unfortunate that our regiments of the Line, for I shall speak principally of the infantry, are composed of ten companies, because ten is certainly an inconvenient number from having so few factors; its half is an odd number; its quarter contains a fraction; but still I firmly believe it would be infinitely better that every one of our battalions of the Line should be formed into two battalions of five companies each, not two separate regiments, but two real battalions of the same regiment under the same Commanding Officer, with one band, with the colours divided between the two. I think that would be a most admirable thing, for at present our battalions are encumbered with a pair of colours, whereas the French battalions have only one eagle, and it is found extremely inconvenient with the present mode of manœuvring. The companies might in time of peace be composed of 80 or 100 rank and file, to be increased in time of war to 200 or 250, and the cavalry squadrons should be organized in a similar manner. It may be said where are these men to come from? I can only say that is a separate question; at least it would be as easy to get them to be distributed in this way as in any other. The surplus could be raised with great quickness from the Militia Reserve, for 50,000 men could be at once transferred from it to the Line, and another 50,000 might easily be obtained with a proper system of allowing men after a certain number of years' service to return to their homes with a kind of retaining fee to join their regiment for one month in every year. I beg to say I must, as a Militia Officer, with all due deference to some of the speakers, object to the principle of making regiments consist of one battalion of regular infantry and one battalion of militia, that is to say, one magnificent battalion and one comparatively not so good—one battalion that will march thirty miles a day, another that can only march fifteen—one with good serjeants, the other with serjeants not one of whom is fit to carry a pack. I do not think that would answer. The connecting link between them at present is a tolerably good one, though an extremely expensive one, viz., a Militia Reserve liable to be drafted to the Army during war. One or more regiments of Militia might be brigaded with a regiment of the line with most excellent effect, but should not form a part of it; the two services should be kept distinct. With regard to the Militia, I am rather disappointed that the annual training, for this year at least, is not to extend to the full period of fifty-six days, in order to increase the efficiency of the men new composing the force, as they have not been through the lengthened course of preliminary drill which recruits are henceforth to have. The great want of the force is good Non-commissioned Officers, for those we have at present are worn out. If we had any plan of making men after ten years' service in the Line go into the Militia they would make good serjeants, but as they now come, after 21 years, they are almost worn out before they join. One of my poor fellows did, at Aldershot, drop down dead after returning from the field on a warm day. They are perfectly unable to carry packs. I could not attempt to make them do so without risking their lives. There is not a Militia regiment, if you put packs on the serjeants' backs, that could march fifteen miles on a summer's day. They are men who have done twenty-one years' service in the Line, and some of them ten years' service in the Militia. How on earth can they be expected to do it? The only thing that seems to me to be done for the Militia—for I see nothing in the Estimates for building barracks for them—is that the recruits are to have more preliminary drill. I hardly know what to say on that point, for I do not know how it is to be carried out. If those recruits are to be attached to the Line I can only say I pity the Commanding Officers of Line regiments who will be troubled with their management. If they are to be sent in billets and to live for a week or two longer than heretofore, in the worst public-houses, infested by tramps and something worse, I am afraid it will not be to their advantage. They will have no corporals, no serjeants; they will have no Company Officers, nothing but an Adjutant. There will be 200 or 300 in each regiment scattered about towns, with nothing in the world to get but bad beer. When first called up they are on their good behaviour; the thing is new to them, they are tolerably afraid of military

discipline, of which they know nothing; but if that time is extended three or four weeks, familiarity will breed contempt, they will become corrupted by the terrible people they have to associate with, and I am afraid they will not be better for it. I would much rather have a regiment for one week more, than have the recruits out for one month more. With regard to the proposed six months' drill for Militia recruits, I literally do not know what it means. With six months applied exclusively to drill, a man can be made to drill as well as he ever can in his life. I have seen that myself in squads in the Guards; a squad which is about to be dismissed as duty men, after four or six months drill, move better than you can get any old soldiers to do; they will never drill so well again. I have been told so by serjeants in the Guards, and I have observed it. I rather regret that the business of the Volunteers has not been left rather more in the hands of the Lords Lieutenant than it has. I think the Volunteers cannot be too much in their counties and parishes, but the Militia should be under the constituted military authorities. I think it is a great advantage that Militia Subalterns will have a chance of getting ensigncies in the Line: it will give us Militia subalterns. It has already increased the demand for Militia commissions. Gentlemen who say that the Officers from the Army after certain years' service might go into the Militia, have not perhaps considered that the difficulty in the Militia is to get Subalterns, Lieutenants, and Ensigns. There is no difficulty in getting good men to command the companies; there are plenty of Captains who have retired from the Army who are excellent Officers, and would like to command companies in the Militia; but you cannot get Lieutenants and Ensigns. I think this will be an inducement for them to come. I will not trouble you at present with any further remarks.

Lieut.-General Sir PERCY DOUGLAS, Bart.: Mr. Chairman, the subject on which we are engaged is indeed a very wide one. The principles of Lieut.-Colonel Leahy's recommendations must commend themselves to every military mind. These require not my advocacy. I was formerly Inspector-General of Militia, and I was happy to hear the preceding speaker allude to many subjects which I ventured to touch upon in a pamphlet which I now beg to hand to him. I have not ventured to publish it, because, without any mock modesty at all, I had not sufficient confidence in myself to suppose that people would take an interest in it as coming from me. Whilst serving in the above capacity I thoroughly gave my mind to my work, and I think every single subject touched upon by Colonel Evelyn is to be found in my pamphlet. I think the vital question in regard to all military establishments, and to all military organisation for England in its present state, is that of fixing the amount of the reserves. There must be some relation between your reserves and your standing Army, or else the expense in time of peace will be insupportable. When apprehensions are allayed and wars cease to be rumoured, we know perfectly well what what the Treasury will do, and the War Office will follow suit; any increase to the standing Army will all be wiped out. The few words I shall speak to you will relate to what I think are indispensable things. On certain points there can be no compromise. For instance, I hold that there can be no compromise in regard to fixing the future establishments of our Army; that we must as a preliminary, and before we decide upon the future peace and war establishment of our Army, or determine what those establishments are to be, reckon with certainty that we are to have reserves which shall fill up our peace cadres to a war establishment, and thereby put us in a position to be safe against all sudden alarms.

To those arguments I intend to confine myself. I think Colonel Fletcher has correctly stated in a very few words what we require, and now as to how the obtaining a sufficient reserve of men is to be accomplished. I am not in official life, and perhaps I have not possession of good information, but as far as I know from what I gather from the public prints and hear from the few professional men with whom I am associated in the country, I believe the present process of recruitment is not calculated to give us reserves quickly. The majority of men choose the long enlistment and not the short, and consequently you are, whether you wish it or not, thrown upon the Militia for your reserves. I believe the Militia will amply provide for this. I believe the Militia properly handled and administered will perform this service, and that if the country take proper measures, a flow of men from the Militia

into the Line may be stimulated by that odious thing the bounty, from which there is no escape, when you want *many* men, however you may dispense with it when you want few men; but properly stimulated by bounties, to which most men wishing to enter the Army have clung, and to which they will cling, and which they will have, I believe the Militia may be made to supply, in ample abundance, everything you want for the defensive interest of the country, both as an Army of Reserve and as a reserve of men for the Army. I shall not go further into the subject of the militia, because I have committed my views to paper. I have not published it, but I dare say the few numbers of my pamphlet which I have distributed will put you in possession of my ideas on the militia question, therefore I shall not intrude upon the meeting by saying anything further on that subject. But, Sir, there are other things in the paper read by Colonel Leahy upon which I think there should be no compromise. I ought previously to have mentioned the subject of the militia quarters. I agree with Colonel Evelyn, for it was an impression made upon my mind during the time I was Inspector-General of the Militia, that the billeting of the Militia is an evil of immense extent; I believe it to be intolerable to the inhabitants of towns, and to be destructive to the interest of the Militia. That is one very material question that we have to determine; I pass over the purchase question, as that is not now to be touched upon; but I have no doubt in my mind that this subject will evoke wide discussions and perhaps some anger, and, knowing as I do, as an old man, the disinclination of the First Lord of the Treasury to put his hand in his pocket, I entertain considerable doubts as to whether that large sum of eight millions will be paid. I think you, as military men, are perfectly competent to give a good opinion upon that question, and if the Secretary of State for War will take his inspirations from our Chairman with reference to the reserve forces, and if he would take his inspirations from military men as to what relates to the regular Army, leaving the difficult question of paying for it to the Treasury, it would be better for us all. With regard to the question of depriving the Lords Lieutenants of counties of the power of granting commissions I cannot refrain from saying this much, I think the military status of every man who pledges his honour to devote his life to his country should exist under the highest sanction; that the Queen should give him his commission, and that from no one else should he take it. I think it will evoke in the militia a fine military feeling, and I am confident, from what I know of the force, it will lead to the very best and highest results. One subject on which I feel very strongly is the localization of our regiments. There is no subject in the whole range of military matters to which I affix a more positive and more certain faith than this, that the regiments of the British Army are unequalled and unrivalled, and that anything that is done to shake the distinctive loyalty and the distinctive sense of duty of our regular regiments will be destructive of the finest force that ever existed. Gentlemen, you may not agree with me, but I have the conviction so strong that I cannot help expressing it; I believe the distinctive element of strength in our regular regiments has been that they have been entirely above national antipathies, that every regiment has been entirely above all provincial prejudices, and every regiment has been entirely above all religious hatreds, and that from the amalgamation of nationalities, of religions, of provincial feelings, we have had in our regiments men associated together amongst whom no combination in any sense has been possible, except in one sense, loyalty to the Crown, obedience to their Officers, and faithfulness to their country. If we commit the sad, the grievous mistake of turning our regiments into local legions we might have large numbers of regiments of the line perhaps not very loyal to the Crown; and I have lived long enough to recollect a time when if we had had large bodies of armed men from the manufacturing districts (which give about one-sixth of the whole Militia of the country), I am afraid that about forty years ago you might have had regiments very ill disposed indeed towards the then Government of the country. We have in our regimental system something strong, something good, something solid, we have something loyal—God grant it may never be otherwise. You young men of the Army exert your influence to maintain that regimental *esprit* which has been loyal, which has been true to its duty. In every part of the world our Army has shown its greatness, and has come

home with flying colours. Besides which, I believe if you are to localize your regiments you will fail in one very important particular. If the regiments were permanently quartered within the small local districts from which they are to take their names—and it is understood that even those regiments which have not specific names are to have specific districts of recruitment—you will I think fail, because I am of opinion that the best system of head-quarter recruitment is this, that wherever a good regiment goes, it exercises moral and social influences, and those influences exercised in a community by a well ordered regiment have great effect in recruiting. A Colonel, who sets not only a noble example as a soldier but as a citizen, having such a regiment will get recruits wherever he goes, and localization will not afford that mixture of nationalities which is so desirable in a regiment. We have had many schemes put before us. There are some who long—those military optimists—for the Prussian system, and they say, "What a grand thing it would be to have "every Englishman a soldier." Yes, it would be, provided that he were a well-trained soldier; but I am afraid if we have the Prussian system all of us would have a homœpathic dose of drill that would do no good, and that we should have few trained soldiers. My old friend, whom I have known from earliest life, Sir Harry Verney, advocates the training of boys in schools. I think the moral influence of this would be beneficial, but I think the professional results would not be worth much. I confess myself to holding the opinion that the elementary drill of a recruit does not make him a soldier. The formation and training of a soldier really begins after his elementary drill is over. I recollect in my own youth I was drilled with the gallant General Sir William Codrington and the gallant Baronet Sir Harry Verney at Sandhurst, but when I entered the 29th Regiment I found such a system of drill that what I had previously learned did not help me much. I well recollect that gallant old 29th-man who drilled us. If I had come out drill-master at Sandhurst I should have had to go through the 29th mill again, and my conviction is now I was very much the better for it. Mr. Chairman, you confessed yourself that people are sometimes allowed to introduce hobbies; permit me for one moment to introduce mine. My hobby through life has been this: the sense that very small moral influences have immense effects with soldiers. I believe we can dive into their hearts; I believe with our men there are apparently small moral influences that lead them to great good, and I think that hard and fast lines sometimes drive them to evil. In that little pamphlet I have ventured to mention something about our punishments for drunkenness. My moral sense rebels at the idea of fining a soldier for drunkenness and not giving him a chance of recouping his forfeitures upon proof of reformation. And mind this, the greatest victory of all moral conquests is the reformation of the drunkard. I am old man, most of you are in the Army, and I appeal to your hearts upon this subject, and I appeal to you in the conviction that you will recognize that it is just and desirable to leave to the poor drunkard the hope that, upon complete reformation, the fines imposed for a vice which he shall have abandoned, will be repaid to him. I have done with my hobby. Don't forget any possible chance of reforming the drunkard.

Colonel AIKMAN, **C.C.**: General Lindsay and Gentlemen,—Colonel Leahy has informed us in his admirable lecture, that the number of men capable of immediate re-organization is 600,000, including the Army, Militia, and Volunteers. He has made some valuable observations regarding 200,000 of these, but his remarks are not applicable to the whole, the re-organization of which is the object of the nation at the present time. It is necessary to have all these forces at once available, with a complete and efficient staff.

The Regulars and the Reserve are well provided for by Colonel Leahy's scheme, but the remainder would become a mere machine, to be worked by the permanent staff of the Army. This plan would exclude from the possibility of advancement, the efficiency and intelligence existing in the Militia and Volunteers.

I need not say that such conditions have invariably been productive of the worst results, whether in connection with the Army, the Militia, or Volunteers.

It will be in the recollection of many of the distinguished Officers in this room that in former times all the staff appointments in India, comprising assistants, adjutant-generalships, brigade majorships, executive and civil engineer appoint-

ments, were held by Indian Officers, to the utter exclusion of the Officers of Her Majesty's service. What was the result? Why every Queen's Officer who had the means to do so, left the country in disgust, while those who were less well off languished in a tropical climate, without a chance of advancement, being doomed to a life of regimental duty. Such a system was most pernicious in its effect. The Militia, though in a different way, suffers from the same causes. There are no prizes. The best men are taken away for the line (a disheartening process to the Officers). County gentlemen care not to take up the commissions, while the rank and file, instead of representing the rural districts, are composed chiefly of the inhabitants of large towns, whence in a great measure the Officers are procured, who attain a better social position by holding a commission. The effect on the Volunteers is of a similar character. This force is composed of separate fragments or regiments, working under different systems, having no organization nor means of advancement. Commissions, therefore, are not taken up by retired or half-pay Officers. Colonel Leahy justly observes that in the Army there should be an outlet for two-thirds of the Officers of the rank of subaltern and captain, to prevent stagnation, so fatal to the efficiency of a military body; but he does not explain how life and activity can be produced in the Reserve forces, and upon this important point, I maintain, will greatly depend the efficiency of the whole fighting force of the country under the new organization. I wish now to allude to the recruiting for the Army and Militia. Do you expect your Militia battalions to be a recruiting agency for the line, whereby to furnish a large Reserve force under the Short Enlistment Act; or do you intend the Militia to be an effective fighting force for defence, and also to support the Army in the field abroad, by volunteering? If the former, the present system is not the best to conduce to this object, as the Militia does not attract a sufficient number of men. If the latter, the perpetual draining of that service of its best blood, renders it comparatively unfit for such a purpose. This I presume may be Colonel Leahy's object in desiring to keep the two services perfectly distinct; the Army recruiting for itself and retaining its own Reserve men to fill up vacancies in time of war; the Militia recruiting for itself, and remaining intact; but I cannot agree that it would be advisable to throw back soldiers who are unworthy of a retaining fee (the cheapest mode of keeping them for active service abroad) on a force that depends mainly on the patriotic spirit infused in the mass by the exertion of its Officers.

On this account recruiting for the line from the Militia by means of inducements should cease, provided recruiting for the Army and Reserve could be accomplished in any other way, or unless an interchange of reliable men could be made in case of the Militia being required to support the line in an emergency.

I am told by some experienced Officers of the Militia, one of whom I see in this room that, but for the perpetual depletion of the Militia of its best men, a corps properly commanded and officered would be capable and willing to do good service, whether at home or abroad. But it must be remembered, the Militia gave but some 5,000 men in 1854, when 40,000 recruits were wanted. Though I have little confidence in soldiers who hold it optional to fight, I have faith in my friend's experience, and if he be right, too much importance cannot be attached to keeping up the tone of the Militia, which, with good management, might be raised in a very high degree. But on the other hand a General ought to know exactly how many soldiers he has at his disposal, without waiting for the men to volunteer that information, and I therefore submit that one Reserve soldier available for defence, and contributing to the prestige of the British Army, is worth two Militia men. I see no difficulty in getting, at a cheap rate, plenty of men for home defence, because, with a little judicious encouragement, the fine military spirit lying dormant in the English people could easily be developed; but for the formation of an Army capable of giving us influence in our relations with foreign Powers, in these days of gigantic armaments, the reserve soldier is invaluable. A Reserve Officer may be considered in the same light, and if he pass an examination, and hold himself liable for service in time of war, Army rank should be granted him, whatever other position he may hold. There would then be no necessity to draft young inexperienced boys into the Army to command our veteran soldiers in the trenches, as was the case in the Crimean war, nor should we be obliged to send out thousands of raw lads, varying in

age from 19 to 21, to recruit the Army in the field, as we did in 1854. What did Lord Raglan say of them, even when sorely pressed for reinforcements? "Their "bones are gristle, their constitutions are not formed, and they die like flies. I "prefer to wait until you can send full-grown men." Now you would have in the Reserve a fine roll of seasoned soldiers, to fill up casualties, without discounting the future, or depriving the remaining Army corps of their best men before sending them to the scene of action. Though Colonel Leahy's observations are most valuable, he has not shown by what means he intends rapidly creating and placing in the field a large Reserve force, regular and irregular, which is the most valuable kind of force which we can have at the price, nor does he show how life and activity, which he deems so essential to the regular Army and staff, can be extended to the Reserve forces. Indeed he makes no mention of a Reserve staff, without which it would be impossible to bring the 600,000 men, whom he states are available for immediate organization, to work effectively and in harmony with the regular forces.

Nothing can be more fatal to efficiency than blocking up every avenue to advancement; and it is in this respect that the War Minister has achieved a considerable success in his proposed measures to make the military services as it were a whole, so that where ability and zeal are to be found, there shall be some way of turning them to account, whether in the higher or subordinate grades. Each service, therefore, should have a certain amount of encouragement, and that can be most conveniently given internally, so as not to interfere with the rights and privileges of the regular army. Should these observations be considered worthy of further information in respect to the reserve forces, I shall be happy to submit a plan which I believe would rapidly give the country a large body of reserve soldiers at a cost considerably less than is incurred by the embodiment of large numbers of militiamen. I beg to thank you for so patiently listening to this digest of one portion of Colonel Leahy's excellent paper, which I have no doubt will materially aid the Government in its difficult and delicate task of reorganizing the military service.

Mr. KNOX: Sir James Lindsay and Gentlemen, it is with the greatest distrust of myself that, as a civilian, I rise to address so military an audience on the subject of military organization. But there are one or two branches of the subject which are entirely questions for the civilian, and on those I will venture to say a few words. In the first place, it is certainly a civilian's question whether he is willing to submit to a general conscription for service in the Army, and the alternative of that, whether he is willing to pay for voluntary service, is certainly also a civilian's question. As it appears to me, the people of this country have certainly declined to adopt the view that every one of them shall be liable to military service, and it follows, as a matter of course from that, that they have adopted the view that they must pay for the Volunteers who they expect to fight for them. That leads me to touch upon the figures which Colonel Leahy has placed before you. Colonel Leahy has made some calculations which, from his point of view, would show that you can have large reserves and a large force for the same amount of money which you are spending at the present time. Now, I should not wish that any number of gentlemen should go forth from this room with the idea that they can have a large voluntary army, that is to say, a large number of men enlisted at their own will, with whom you make a bargain to serve you, for a small cost. This is utterly impossible. You must pay for them, and the fallacy in Colonel Leahy's statement, as regards his figures, is this: he has calculated the cost of pensions, and has compared the cost of pensions deferred for 30 years, with the cost of pensions deferred 20 and 10 years. Of course we all know the present value of a deferred annuity varies in proportion with the period for which it is deferred, and the argument that pensions to be paid 30 years hence are cheaper generally—of course, that would be so in the first instance—but cheaper than pensions to be paid ten years hence, would have the same fallacy as if we were to say that by investing six millions or ten millions now, at interest, for a certain number of years, we should be able to spend double the money, a certain number of years hence upon the army services. Of course we are not ready to bear that burthen now; we cannot pay for the present year's expenditure and future expenditure at the same time; it would be utterly absurd to do so; but it is by a calculation of this kind that Colonel Leahy has

shown that a large economy would be derived from his plan of paying reserves for the Army. It is quite clear, if you have large reserves and pay them *4d.* or *6d.* a day, it will be a great burden upon the country; but it appears to me, in declining compulsory service the people of this country must be willing to pay for the expense of that force which the country generally, not simply the military authorities, but the country generally thinks necessary for its defence. That leads me to one financial subject also touched upon by a gentleman opposite. There is no doubt that the subject of billeting the Militia has very frequently caused much anxious consideration to all Governments who have held office since the Militia were called out in 1852, and the billeting question is one of great difficulty. They have been very anxious to have barracks for the Militia, but they have always seen it would cost a very large sum of money, and when the Militia have hitherto been called out only one month in the year, it seemed a great extravagance to build permanent buildings for the whole year, when the men were to occupy them only one month. But the proposal that has been made by the Government is this—that the county authorities shall borrow the money, and shall repay that money in a period of 30 or 40 years, which, of course, is a very long time, and if borrowed from the Public Works Loan Commissioners, that they shall repay it in 30 years, at the rate of about 5 per cent. per annum; and in the meanwhile to aid them in repaying the cost of those barracks, they would be guaranteed the billeting money of the regiments in the different counties, and this would, in so long a period, if not entirely, very nearly cover the cost of erection of those barracks. I now, perhaps, may be allowed, though I am not a military man, to touch upon one or two subjects which are of a more military character, and have been alluded to by Colonel Leahy. I think that he has certainly hit upon the right plan in the propositions which he has brought forward with regard to organising the force which we have at present, in order to make it one complete whole; and this is also the object, as I understand it, of the Government measure. The key of Colonel Leahy's plan is short service, double battalions (which have been alluded to by a preceding speaker), and the intimate connection between the Militia and the Line. Now, I believe that the whole key to the question of our reserves is this connection between the Militia and the Line. The short service, it is hoped, will give us a very fair reserve. It is, of course, entirely an experiment; we cannot tell how it will succeed with the people of this country. The six years' system has been tried during the last five or six months, and it has not been, as has been stated, an entire failure, although it may have been so in respect of the stationary regiments of the Guards. But in the infantry, which is the only other branch of the service in which it has been tried, the number of recruits for short service has been, for some time past, 25 per cent. of the numbers enlisted weekly, since the increase of 20,000 men in August last. When we remember that it is a first experiment, that the period of service is six years, which, comparatively speaking, is not a very short service, inasmuch as we had ten years before, I do not think it can be considered a failure; but if it be reduced to 5, 4, or 3 years, very likely the results will be found to be very different; at all events, it would touch a very different class of men. If these men do not come forward, and we do not get our reserve in that way, we must fall back upon our Militia, and the question is how shall we connect our Militia with our Line. As I understand the principle of the Bill which has been brought forward, it is that the recruiting for the Militia and the Line shall go on together, and shall be undertaken by the same men, that the recruits will be collected in the same place, and will be drilled together, and you will hardly be able to discriminate between the Militia and the linesmen; they will be trained together at local depôts, and the Militia recruit may practically turn himself into a Line recruit if he likes to do so, after he has been a short time training with the Line. That, of course, would be a connection between the Militia and the Line; and if a system were established of using the Officers who were upon half-pay, or may leave the Army on half-pay, for officering the Militia, those same men being liable for service, in case of emergency, in the Line, and taking their Militia reserve men from the Militia regiment to the Line when called on; it would also increase the connection between the services. By that means you would have a number of Officers, as well as men, in the Militia Reserve, and in time of emergency

they would join the Line regiments together, the Officers being old soldiers, men who had served in the Army, and would complete and fill up the attenuated cadres of the regiments that you maintain during peace. Of course everyone knows who has looked into the subject at all, from an economical point of view, that it is utterly impossible, as General Peel stated in the House of Commons, for us, at any cost, which the country is likely to bear, to maintain in time of peace large regiments at their full strength. We must be prepared to maintain a system of numerous cadres, those cadres consisting of attenuated battalions; but we must have the reserves ready, and if not obtained from short service men, we must have them, at all events, from the Militia to complete any deficiencies that may exist in those regiments, in order that they may be, in common parlance, "available at a moment's notice" to take the field. We should have, as the Estimates of the present year provide, cadres ready to take the field to form the first line, as you may say, of defence: and I say of defence, because I believe the people of this country have made up their minds never to send a large army abroad; they are willing to have a large army at home, and to pay for it; they are willing to have a sufficiently large force at their disposal perfectly ready to take the field for defence. I feel I have trespassed very much upon your patience and time in making these remarks.

Captain MONCRIEFF, Edinburgh Artillery Militia: I have some diffidence in expressing an opinion here, but having confirmed views, which I have already expressed in papers upon the subject, and being a militiaman, I wish to make a few remarks. I conceive the object of this meeting is much more to go into the general principles of any scheme for the purpose of Army Reserves, than to discuss details, and financial questions. Colonel Fletcher struck the proper key note when he remarked that the real object before us was to discuss some method which would enable England to put into the field a sufficient force to meet any invading Army that could be brought against her. The Militia is now to be relied on to form a portion of this force. It has been too much the fashion for regular soldiers to apply to the Militia, regulations, which they know would deteriorate the character of more regular forces. I think you will allow that the Militia is composed of very much the same elements as the line, and if required for military service, it is desirable that it should be treated on sound military principles. I thank the gallant Officer who spoke last but one (Colonel Aikman, **V.C.**), for indicating what would be justice to the force to which I belong. If the Militia is treated in a manner which would destroy regular soldiers, of course a different result cannot be expected with a force, labouring under much greater disadvantages than the line. In Colonel Leahy's paper the first question brought forward is in these words:—"The reform of our military organization should be such as to enable an Army of about 200,000 infantry, with a due proportion of cavalry, artillery, engineers, and train, to be placed in the field for home defence." The question I conceive is, of what is this force to be composed? If it is to be composed entirely of regulars, then of course there is no occasion for taking very great care of the auxiliaries required to fill up the numbers, but if that force is to be partly composed of Militia, and to be useful against invasion, I must say 200,000 men is a very insignificant force to meet such an expedition, attacking at different points, as would be brought against England. If that number is increased, you must fall back again upon the Militia for the largest and most reliable supply of men. Are you then to treat the Militia as a reserve, or as a mere feeder of the line? If it is to be looked on as a reserve, I think it ought to be treated in such a way as to make it *a bonâ fide* force; if, on the contrary, it is to be looked on merely as a cumbrous means of recruiting the Army, and is to be called on for its best blood to nourish the line, you are treating it in a manner which is not likely to lead to very good results. I happened to be in the Mediterranean during the Crimean war, and I recollect a Highland regiment quartered at Gibraltar was asked to give volunteers to the Highland brigade under orders for immediate service. The most enterprising men joined these regiments. A very short time afterwards the regiment which furnished these volunteers was ordered to the Crimea. I consider nothing could be more unjust and impolitic than that course. The same process has been adopted in the French Army, in drawing the whole of the best men out of the different regiments for the *corps d'élite*. We know what has been the result. I submit to this

meeting that if we are going to depend upon the Militia as a large part of the force to defend our shores, it would be a more economical method to allow the line to recruit its strength for itself, and to have its own Reserves. I cannot conceive a more expensive, a more extravagant manner, of recruiting the Line than by taking away the whole satisfaction of the uphill work of forming efficient regiments from the Officers of the Militia. Referring to another part of the subject, it appears to me that no adequate provision is made for obtaining the conditions referred to by Colonel Fletcher, in the matter of organization. If the Army corps in different districts had been supplied with the special arms, &c., and a proper and complete staff to administer their own affairs, and to bring together all the military elements in the district; by that means an organization would be developed, which might be depended on to meet an enemy successfully. It has been too much the fashion lately to scout the idea of England copying the Prussian system. I suspect that the part of the Prussian system which is in the minds of most of those people who express this aversion, is only that part of it that compels everybody to serve. Much the most important part of the Prussian system, however, and the part we should copy, is that admirable method and arrangement which enables the country to allot its forces to individual districts, and to maintain them in distant war as successfully as at home. These districts are organized in such a way, that in peace time their administration is carried out in the same manner as in war, and when these army corps throw off a field force or the fighting portion, they leave the rest and a part of the staff at home, and the connecting link is filled up by another service, viz., the "etappen," which does not belong to any particular army corps, but which connects the home staff and sources of supply with the field force, however remote, and guards the route. If a similar system was applied to our forces, I have no doubt that those failures which take place at the beginning of our wars, and the extravagant expenditure belonging to them, would cease to be reproduced.

Captain Moncreiff has requested that the following remarks may be added, he not being able from indisposition at the time to finish what he wished to say:—

If the object of a reconstruction of our military system be to enable us on short notice either to repel a sudden invasion, or at once to throw an army into an enemy's country, in order to keep war from our own shores, and this I presume is the case, then two important conditions are required:—

1st. A compact and efficient Army always ready, with large reserves in support.

2nd. An organization for working this force adapted both for peace and war, for home or abroad.

It is now practically admitted that the first condition can best be obtained in this country by using for that purpose both the Regular Army and the Militia. The Line, therefore, with its own reserve, is, of course, of first importance, next the Militia, with its reserve.

My argument is that the best results could be obtained by treating the Militia somewhat in the same manner as the Line, that is by having a small part of the whole force embodied during the whole drill season, always ready, highly trained, acting as a school for Officers, and a sample for the rest of the force. This part to consist say, for example, of one battalion of each brigade called out in succession, the remainder being treated as at present.

When the time arrives that the Line requires supports, whether that be at home or out of the realm on an emergency, the Militia, in the first case would be ready, and in the second it should be permitted to volunteer by battalions, not as individuals. Those battalions permitted to volunteer for temporary foreign service should be returned to the Militia after the war, not absorbed into the Line like a large proportion of the regiments now composing it.

This treatment would at once make the Militia a valuable and self-reliant reserve not an expensive recruiting machine. The return of a battalion after war to its own division and ordinary duty would give a tone to the whole force.

It is felt by every intelligent Officer of Militia that his service is generally treated as a mere convenience for another force, and that it is without hope and without reward.

With regard to the most difficult and important question, that of Officers, surely

the best plan is that which will give the best results. If a large number of Officers are made to pass through a term of service in the Army and Militia, and some process like the Prussian one be adopted for creaming these, and only retaining for permanent staff and promotion the men who show very high military talents, this process might be expected in time to give Officers as well qualified for their work as a system which professes to make every or any Line Officer who has gone through the regulation course, equally eligible for the prizes in the Militia service. Is there to be no hope left for a Militia Officer who has gone through permanent service, who is qualified, and stimulated by inclination to pursue, and to excel in, the calling he has taken up. To encourage such men is to improve the force to which they belong.

When it is possible to exact any standard of efficiency that may be required, what good object can be attained by shutting the door to advancement upon a very large class of gentlemen who are ambitious to become useful servants of the Crown.

If military merit in the Militia is allowed to receive military reward and employment as it does in the Line, the nation, I am convinced, will reap the benefit of thus applying sound principles to its constitutional force. If, on the contrary, the Militia is deprived of all share in its own administration, no portion of it permitted to remain together long enough to be quite efficient, or to form a school of its own, then it will be discouraged, it will languish, it will be despised, and it will not be so ready to stand in line against a modern army, till after a much larger embodiment and a much larger, and perhaps less successful, expenditure.

Any regular force that will ever be maintained in England will be too small for the requirements of the empire when the moment of real danger approaches, and such moments now come with but a short warning. It would be well, then, to pay more attention to the composition, organization, and I may add *amour propre* of that portion of the national Army, which ought to embrace all classes of society, and which can be enlarged to any extent without infringing our ancient laws.

The Militia is the force which represents that military service which the State is entitled to exact from its subjects by compulsion. Under its banners the population will be mustered in the last extremity. The gentlemen of England should not allow the abrogation of their prescriptive right to be among the natural leaders of a chivalrous nation. It is impolitic in a free and independent community to make this important duty exclusively devolve on purely professional soldiers, of which, moreover, there is but a limited supply. The service of no profession is impaired by having some rivals for efficiency and promotion to compete with its regular members. It should not be made impossible for the Militia to produce again, as it has done before, a Lynedoch or a Washington. A high standard of efficiency to qualify for selection is preferable in this case to the other alternative, as it will not only elevate the service to which it is applied, but bring into it the best professional soldiers.

In the face of European events it is to be hoped that something will be done to make this force what it should be, a Home Reserve, on which, along with the Regular Army, the country can safely rely.

Next, in regard to organization, it appears reasonable that the first step, and most direct path to obtain a good military organization, is to establish some complete theoretical unit representing all arms, and administered by its own staff. I am glad to see that Colonel Leahy goes further in this direction than he formerly did. It would have been well for the progressive development of a sound military system if the Government scheme had been more explicit on this all important condition. I see no adequate provision for the transfer of administrative responsibility to the Generals commanding each district, nor for the proper allotment of special arms, ambulance, store, ordnance, &c., &c., for the 120,000 Militia alone, not to speak of the Regulars and Volunteers belonging to the proposed districts. Neither is there any plan for creating out of the elements composing the force a divisional and brigade staff for this national army, either at the trainings, or if suddenly required for war.

If anything really deserving the name of a proper or war organization was intended, would not the money asked for barracks rather be applied to storehouses at the divisional head-quarters, and tents for a field force?

What need has a force of this kind for barracks? It is only called out in the drill season, and then it should be massed, so as to get the most experience in the shortest time.

The regiments of the southern district would be better placed under canvas in the New Forest than in the streets of their county towns, and in the north there are moors enough for the largest numbers; such positions, however, do not yet appear to have been selected.

I shall not here repeat arguments which on fitting occasions I have used to show the necessity of *decentralization*, not only as applied to the administration of complete theoretical units of the forces in the shape of army corps, but also to the distribution of the great military stores, and in a more limited degree to arsenals, although such distribution on sound strategical principles is within the subject of debate, as well as the independent administration of the army corps. It cannot be denied that both are important elements of safety as well as readiness for action.

A sound military organization, based on correct principles, is the foundation of real efficiency. In England our centralization is the great impediment, as it was in a less degree in France, to our obtaining that all-important condition. Our system is neither expansive nor ready. Every new expedition is open to risks of miscalculation, want of supplies, and want of knowledge, as there is no standard in peace time to represent the requirements of war. The civil and political element in the administration in London can, at any important juncture, neutralize military knowledge. On any emergency the Commander-in-Chief, instead of being free to plan in advance, and hold the whole forces together, is liable to be hampered with district details, and arrears, that could better be settled by Generals commanding army corps.

If these statements be correct, perhaps it would be better to provide a good organization based on the formation of complete military units, and on decentralization, before discussing the purchase system, or even settling the component parts of the forces.

Mr. DICKINSON: I feel the same diffidence that the speaker on my right hand expressed recently in addressing a meeting composed so largely of military men, and I should not venture, more than he has done, to address them on purely professional and technical subjects. But I think he has touched on one of the most important points that has been raised to-night in discussing the question of our reserve forces, with reference to which he said it was clear that the people of this country had made up their minds not to adopt a compulsory system in any shape, but, on the contrary, to pay any amount required for a voluntary service. I think I am not misstating him, and I wish to explain why I believe him to be entirely mistaken. I was compelled to make up my mind on the reserve question a short time ago by being asked to join a movement for a more energetic foreign policy, and, on full consideration of the subject, I came to the conclusion that compulsory service must be the basis of our system of national defence; while the only immediate support to the Army would be no doubt the resource pointed out by Colonel Fletcher, of embodying some regiments of Militia and making them fit to take their place in the Line. And you must remember the Duke has been quoted as using the strongest language on both sides of this question. As to the efficiency of the Militia, he gave the strongest possible evidence in the debate of 1852, though he has been quoted as comparing them to a "rabble" on other occasions. It just depends on whether they have had the training of men of the Line, or whether they are taken with their usual monthly training in a perfectly inefficient state, as to whether they are good for anything. Having satisfied myself that we could not obtain an elastic system of reserves without adopting the compulsory principle, I found, to my surprise and regret, that high military and civil officials entertained the opinion that has been expressed by the gentleman on my right, that "the working-classes in our day never would tolerate compulsory service and registration, and it was quite out of the question to propose such a thing!" Now, I had some experience of the working-classes about fourteen years ago, when I found them as generous, disinterested, and patriotic as any other class of the people of this country; and the recollection of this persuaded me that if a proper appeal was made to their love of their country, and their

sense of its dignity and its interest in foreign politics, that they would be as ready to respond as any other class of the population. Therefore I thought the best thing to do was to go and ask them myself whether the official view of their character was correct? So I wrote as hurriedly as I could a short pamphlet, which has been in the hands of some of the gentlemen present, recommending compulsory service for the Militia, without any mitigation at all, and registration. I submitted this to some of the leaders of the working-classes in London, and I have been since in communication with them, and I must say the result is very satisfactory to me. I find that although there is a small class who wont reason about the thing at all,—they start with a decided prejudice against it, nevertheless I am prepared to say the majority of the leaders of the working-classes, backed by hundreds of thousands of the most intelligent and best organized mechanics and artisans throughout the country, are in favour of compulsory service. I do not mean to say that their ideas are distinct and clear; I have not yet had sufficient communication with them to speak positively on details.

Mr. KNOX: Does that apply to foreign service?

Mr. DICKINSON: No, I have not proposed it for foreign service, but if you get an ample, well disciplined home force, depend upon it your Ministers will not be so stupid as not to be able to find sufficient volunteers in it for a foreign war in case of need. From personal experience, I find the great majority are not merely in favour of compulsory service for the Reserve forces, but convinced that any scheme of Army reform which does not include it, will be a sham. They have not yet, particularly as there is now a Trades' Unions Bill before the House, which occupies a good deal of their time, been able to settle how the principle should be applied. No doubt they will be a good deal guided by what passes in ensuing discussions in Parliament. But they feel as strongly as some of us do that the country is endangered and has been degraded; they feel as the Prussian organ told us, that our military system left us no possible attitude but that of effacement. They feel that we have been effaced in the Black Sea question, and in the Luxembourg question, and that we shall be again effaced in the settlement of terms with France, and they feel it as strongly as any man here present. I think, therefore, having had this personal experience of their feelings, that it has been assumed without inquiry that the people of this country have made up their minds not to adopt a compulsory system in any shape; that on the contrary there is a strong popular feeling in favour of a trained nation as well as a trained Army, and a general conviction that the expense of providing on the voluntary principle such a system of reserves as is required in modern times, is greater than any nation could bear, and is quite out of the question; and instead of attempting such a thing, we should enforce that duty of every man to share in the defence of the country, which is recognised by our oldest law, and is the base of our Militia system.

Colonel ALCOCK, Commandant Royal East Middlesex Militia: I will only ask leave to take up your time for a few minutes in order to bring to the notice of the meeting, that from the time when the gallant Officer who made his observations in the beginning of the evening, to those of the gentleman by whom we have just been addressed, the subject discussed has been, not so much as to how the men are to be organized, but been to the source from whence they are to be obtained. It has been a question of ballot with substitution, or with compulsory service; and that is really the great question to which we must come at last. I am firmly convinced in my own mind of the necessity for the ballot, but perhaps I might not be allowed to take up your time by giving you my reasons for it. I therefore come at once to the most important point; if I make no mistake, Mr. Cardwell in his speech on introducing the Army Estimates, quoted a document drawn up by the late Mr. John Robert Godley, in which that gentleman, treating the ballot as a form of conscription, said that it was a tax by lot, and therefore confessedly the worst kind of tax which a Government could enforce. Now, what I should like to know is, whether that is the case or not, and I am quite certain there are many in this room who could answer me; it is my belief that it is not as he supposed, and I think you will agree with me that the ballot is not a tax by lot, but that it is a general tax, and a very light tax upon all those who are liable to be

drawn, and that it is so for the simple reason that they all in their separate clubs subscribe a small sum, and that sum goes to pay for a substitute should any one of the subscribers be drawn. It therefore, is a very light and general tax upon all those who are liable to be called upon to serve, and not as represented in the House of Commons, that it implies personal service or a heavy tax by lot. I only wish to express my opinion that the ballot ought to be introduced, and that the reason given for not introducing it, is not a sufficient reason. It is this, that under present circumstances or in ordinary times, we can do without it, which may be the fact, but the difficulty you have to deal with is, how to be prepared for a time of great emergency, such as may possibly be near at hand, and I consider that we should at present have the machinery by which under the most pressing circumstances we can be prepared to bring up our men in each military district. What I say is this, and it is very simple. In any military district if they fall short of the quota of the number of men required, instead of our getting the remainder through the recruiting sergeant by lowering the standard, and taking an inferior class of men who would be no acquisition to the Line if they volunteer, and anything but an advantage to the Militia if they remain, the country should be required to produce them, and if under present circumstances we can do or almost do without this measure, it follows that under present circumstances it would not be a very heavy pressure upon the counties to introduce it. But what would then be the result? It would be this, that we should have that machinery working by which, when a great strain comes as it did in the Crimean war—and we all know and constantly refer to what was then the case—when a great strain of that description comes, the machinery would be at work by which you can bring up your men, and in these times with the astounding military events which have recently taken place in Europe before our eyes, is it not self-evident that it is by previous preparation alone, that we can be in readiness for defence; that if you depend solely upon the professional soldier, however strong your confidence may be in him, even against the most desperate odds, our position is a weak one? The professional soldier must be supported by enormous reserves, and you cannot have enormous reserves without having in readiness a machinery which you can work upon an emergency, for when the moment arrives when it comes suddenly upon us, you may depend upon it that there will be no time left then for improvising an army. We have an example before our eyes, we have it staring us in the face, and surely we should not imitate the system of the French, but adopt our own national system, and then without further legislation the thing will be done. The machinery exists, Pitt's machinery of 1798 under the Act of George III, by which the Army received for many years its most abundant supply, and its best recruits; it is only necessary to bring the ballot into working order in a light measure during peace time, and you will have in it a most efficient working system for war, for the time when a great and sudden effort for the defence of the country will undoubtedly have to be made, for these are days when events of no ordinary magnitude impend.

Captain HOSEASON, R.N.: Lord Derby in a late speech stated that when Parliament met, they would have to consider whether the organization of our Army should be based on a plan for defensive or offensive warfare. It is evident that it is impossible for this country with its vast colonial possessions, and immense amount of floating wealth, to adopt a purely defensive system, and the effect of Mr. Cardwell's and Colonel Leahy's propositions is, that they are nearly entirely defensive. There is no inducement held out to the Militia to join the regular Army in sufficient numbers to supply the wants of an Army on active service abroad. During the Crimean War Lord Raglan's operations were cramped mainly for the want of a sufficient number of men—it is stated that the active Army was then 60,000 short of the votes of Parliament.

We have all the requisites to form a cheap Army, and greater resources than any other country in the world. The demands for war are for money, men, plant, or manufacturing establishments; munitions of war, and steam motive power; in every one of these we exceed any other country both relatively and absolutely.

The population of this country alone amounts to 31 millions, and comprising India and our colonies 250 millions. The annual value of our imports and exports have already reached the extraordinary amount of 530 millions, besides the value of the vast fleet employed in the trade.

Since the Crimean War, or from 1855 to 1869, the value of the imports and exports per head of population has nearly doubled, that is to say, it was £9 a head in 1855, and more than £17 in 1869. It will be seen that in this estimate the nature of the imports of specie is not stated, for I am ignorant of its amount, not knowing where to look for the records, if any such are kept; but as the balance of trade is greatly in our favour, the amount of specie paid to our merchants and capitalists must be something enormous.

I have here enumerated most imperfectly the mere annual floating wealth, not the amount accumulated, which is represented by Mr. Porter in his work on the "Progress of the Nation," as *real* and personal *property*, for that must be represented by *thousands of millions sterling*; for writing in 1845 with the information collected by Government before him, and before the discoveries of gold in California and Australia, he states that the *real* and *personal* property of this country had increased since 1814, or during the first 31 years of peace, *two thousand millions!*

The present demand for the Army and Navy Estimates is, in round numbers, 25 millions, which is a very low policy of insurance on such a vast amount of wealth, especially as we have no estimate of the value of the Government military plant distributed over our 46 colonial possessions in every quarter of the globe.

The value of our Navy is two-fold, for it aids and assists our mercantile marine, besides defending them; men-of-war are the head-quarters of the police of the seas, and the Captains of these vessels are the magistrates, who are often called upon to decide most important questions.

I have stated that Colonel Leahy and Mr. Cardwell's plan of Army organization is defective in one grave particular, for neither offer sufficient inducement for the Militia to volunteer in numbers to strengthen the Army in the field. I consider a ready flow of volunteers could easily be obtained at a very small cost to the country. I would simply offer to every man that volunteers for a term of years for the regular Army, his provisions *free from charge*; this would in round numbers better his condition by 6*d* a-day or £9 a year. The ordinary seaman, who has yet to learn his profession in the Navy, gets 1*s*. 4*d*. a-day, with free rations, whilst the soldier receives only 1*s*. 2*d*., and has to pay for his provisions. Soldiers volunteering for service in India, obtain a slight addition in pay, and free provisions from the East Indian Government. Consequently, despite the badness of the climate, the service is always popular, and men are easily obtainable. So they are in the Marines, who regularly enough receive free provisions only whilst serving on board ship. I would include them in the same regulation as soldiers volunteering for the active service. Mr. Cardwell's plan of organization differs with the Prussian system in one important particular, it cannot pass from defensive to offensive operations immediately, for it is composed of regulars and irregulars or of men that cannot be sent across the frontier without their own consent; out of 470,000 men we have only 108,000 available and a small reserve force for active service out of the country, and it is to obtain a greater command of men that I suggest the above proposition.

Captain HEATHORN: To enable you to get men freely for the Army, two things are required, one, the chance of promotion for all; the other, surety of provision in after-life for those not up to that mark. Every man is not good enough for promotion, few possess the requisites of a good Officer. But if all in the Army had a chance of promotion, and those who knew (or were soon made to know) that they were not good enough to participate in that chance felt that there was some provision for them in after life, the ranks would fill easily.

Captain STRANGE, R.A.: A good deal has been said about catching hares by various methods, but no doubt you must catch your hare before you can cook him. We have a force of something like 90,000 valuable hares already caught. We have not as yet said one word about organizing or arranging them. Colonel Leahy, I think, has touched upon the right unit—I am now speaking of the artillery, the importance of which is everywhere acknowledged—we have 30,000 of the regulars, or the first line, and 30,000 of the Volunteers, and I suppose you may count on almost an equal number of Militia. This is a tolerably large subject for consideration. Colonel Leahy, I think, hit upon the right unit when he spoke of a battery of eight guns. Of course that is reducible to six or four in time of peace. In time of war it is

particularly convenient, because you send four to one flank, four to another. If you have six, you break up a subaltern's command when working by half batteries, and though it may be a small thing to speak about a subaltern's command here, when we have been talking about tens of thousands, still it is a tactical unit. If you have the eight-gun battery, you do not break a unit. But Colonel Leahy speaks of four guns, and four others somewhere in reserve. I do not see how the four reserve guns in field artillery could be made sure of as forthcoming, because although you can very intimately associate the garrison reserve gunner with the gunner of the first line, there are insuperable difficulties in making quite sure of the reserve field gunner or driver when he is wanted; all those difficulties about driving and so forth, which are not to be got over in a day. Therefore I think that relationship would be a very difficult one to establish. There is another point which ought to be considered. A single regimental organization for 30,000 men is a thing unheard of in any other country. Let us hope that the artillery will be made into divisions corresponding to Army corps. I must disagree with a previous speaker, who condemned localization. I think it is built upon human nature and human instinct. Moreover, strict localization is absolutely necessary to the efficiency of a garrison artilleryman, whose chief duty consists in intimate knowledge of the armament, forts and surrounding country. You will say at once, how are foreign reliefs to be carried out? It would be a very simple thing. The artillery brigade system I suppose, of course, to be effete, and the head-quarters of local Army corps artillery being always in the same place. A battery, a real unit, is sent to India or elsewhere on service. When they reach India, these batteries can be attached to Army corps, corresponding to the infantry and cavalry Army corps, which it is also to be hoped will be established there, because without Army corps there is no Army life or movement. They come home to head-quarters at the end of their service, and before they go abroad again, they may be sent for six months to Shoeburyness, to Woolwich, or elsewhere. As to the intimate application of your volunteer and Royal garrison gunner, garrison artillery must be the second line, for taking your fleet as your first line, it is to be hoped our enemies will find *some* big guns to run against on our coast before they establish a landing; therefore the importance of the garrison gunner I take to be very great. I am sorry to say there has been a makeshift in turning into new field artillery these old garrison gunners, the most accomplished soldiers in the British Army. I mean to say they have more to learn than other soldiers; whether they learn it or not, is another question. I am sorry to see in Mr. Cardwell's Bill also a remark which implies that the Lieutenant-Colonels of artillery, who are to be attached to the artillery reserve of the districts, are to be considered merely in the light of technical instructors. I submit to any soldier whether for a Lieutenant-Colonel to be considered as a technical instructor, and to have no command, is not a very anomalous position. With regard to technical instruction, it is not the custom in the Army for Colonels to instruct technically, their especial function is command and administration. If you want technical instruction, you must seek it in the junior ranks. It is also a mistake to think of uniting the garrison reserves so very strongly with the reserve infantry. They should rather be affiliated with the first line of garrison gunners. Just consider what do you want them for? The first want is to man your fortresses, and they ought to know beforehand the ins and outs of the forts, the distances of buoys in the ship channels, the ranges to all marked objects seen from the batteries, what guns they are going to work, and everything about them. These things they will never learn, if you do not ultimately associate them with, and put them in some measure under, the control of the Royal Artillery Officer commanding the district. Now I would appeal to the chivalry of our gallant Chairman to consider and advocate, that a subject which involves technical efficiency of something like 60,000 reserve gunners, should be in the hands of an Artillery Officer, at least his equal in rank. I hope I may not be considered impertinent in saying so, but the attention of many people is drawn to a most able scheme by Colonel Harcourt, of the Cinque Ports Artillery. If you only read that scheme, you could not help saying, "Here is a man who is born a soldier." I think that that scheme is one deserving of very great attention. I have occupied your time quite long enough. I thank you for hearing me so patiently. I think I shall be acquitted of anything

like impertinence, and anything I may have said will simply be put down to honest earnestness. I may be mistaken, but I do not think I am.

Colonel LEAHY: In reply to the various speakers, I shall first refer to Colonel Fletcher's observations, which have commanded great attention. He said that the scheme propounded failed to provide immediate elasticity. In reference to this I would call attention to the diagram (Appendix C) showing the present and proposed establishments, and point out that Mr. Knox has stated that we have at the present moment 20,000 militia men under an obligation to join the regular forces. By calling on these 20,000 men to join regular regiments, and recruiting to the same extent that we have done during the past half year, we might during the coming summer complete the establishments of the 100 battalions of infantry, numbering 100,000 bayonets, which I propose to keep in this country in constant readiness for active service. That would be our first line. We might augment our second line by remitting trained soldiers into the militia or militia reserves as quickly as possible. The second Army reserve (30,000 men) should form part of that second line and of the garrison reserves to be furnished from it. As many of the 40,000 soldiers engaged in 1867–8 as can be replaced ought to be bought out of the regular Army at any reasonable cost and passed into the second line. These measures would give the means of an immediate increase of the available forces, and quickly bring up the infantry to the revised proportion.

With regard to Colonel Aikman's remarks, I have never proposed to transfer into the reserve, soldiers unworthy of being retained in the regular Army. There are three classes of reserve service which may be rendered to the State: first, the volunteers; men who drill in their own time and near their own homes; secondly, the militia, men who drill for a limited time in the year, but as a rule in their own counties; and, thirdly, the Army reserves, who should be liable to drill, and serve wherever they are called upon to do so. There are many men who might be glad to join the militia reserve and serve near their own homes who would not care to join the Army reserve and come out for training with their regiments, possibly at places and times that might be inconvenient.

I think a large discretion should be given to Colonels commanding regiments to pass into whichever reserve they think fit, trained soldiers who could be replaced by young men; of course the payment of the men in reserve would be regulated accordingly. An Army reserve soldier—ready to go anywhere he might be ordered—should receive more pay than a man who would only serve in his own county or town.

With regard to what Mr. Knox said as to the fallacy of my calculations of cost, owing to pensions being taken into consideration, I submit that it is right the cost of pensions should be shown. I think one of the great defects of our army administration is the neglect to show prospective charges, consequent on changes of organization, recruitment, &c. There is a tendency, in framing each year's Estimate, to throw on future years charges which ought to be faced at once. We have had an example of that in the case of the re-engagement of soldiers in 1867–8. 40,000 men were engaged, for whom a very large prospective liability for pensions was incurred. This did not appear on the Estimates, and will not appear till nine years hence. Unless something be done to pass these men into civil employment, or into the Reserve, we shall, nine years hence, have an additional non-effective charge of over half a million per annum.

I think the Army Estimates should make provision for the pensions of men engaged for army service concurrently with that service.

If barracks for militia are wanted, and the cost is to be covered by the billet-money, they ought to be built by the War Department, and not by the counties. I think if the general public are to pay for them, in the shape of billet-money, the sooner this is done the better, as if built by the War Department they will be more generally useful than if built by the counties.

Captain Moncrieff endorsed much of what Colonel Fletcher said, and I must make the same reply. I would observe that I do not propose the Militia to be the recruiting ground for the Line, on the contrary, I would remit as fast as possible trained soldiers into the Militia.

In the diagram (Appendix C) the Regular and Militia infantry are shown as together, making the first two lines. The Militia would, in fact, form part of the 200,000 infantry that we gave in proposition No. I as the number necessary for our field forces. The numbers of Regular and Militia troops actually provided for in the Army Estimates 1871-2 are 286,000, and I show (Appendix C) how I would increase them to 370,000 (exclusive of Volunteers), namely, 120,000 for garrisons at home, and 250,000 for field forces. Of the latter forces 200,000 would be infantry (Regular and Militia), and the remainder (50,000) would be made up of cavalry, artillery, engineers, and control department. I believe that 200,000 infantry would be sufficient for any Army we are likely to be called upon to put in the field. By adopting the regimental organization indicated we should be in a position to at once form efficient army brigades and divisions. I have also indicated the way in which the Reserve Staff is to be selected.

I, therefore, repudiate the charge that I have not thought of what is necessary for imperial purposes, and the imputation that means are not proposed for immediately bringing about a proper organization.

With regard to my calculations as to cost, I would only say that, if they are wrong, this should be proved, but if they are right I think I have shown how by the adoption of an elastic regimental system, a system which I am glad to find is supported by nearly all the military men who have spoken, the country can get regimental establishments of infantry at home, in India, and in the colonies, exceeding those at present in existence by 54,000, and at a diminished annual cost of £300,000. If that result can be produced, the scheme is at any rate worth consideration.

I have, in conclusion, to thank the meeting very much for the attention given to my paper and observations.

The CHAIRMAN: At this hour of the evening I will say but very few words. I think we have had a satisfactory debate to-night, very much to the point, and the observations made have been conducive to the elucidation of the question. Colonel Leahy has reason to be gratified with the attention his paper has received from you. There is no doubt whatever that a great movement has been made towards organization. I do not say whether the Government plan goes far enough, on the contrary, I think in some respects I should personally have been glad if they had done more towards training the forces we have. There are only two ways of dealing with this question, one is compulsory service, and the other is finding the money. In the one case you have a good system of defensive force, in the other case you require a large sum to be found, which the public may or may not be disposed to pay. When that great question comes forward of finding billets for the Militia, it must be met in its integrity, and if it is found that the counties are willing to provide, or speculators are willing to build barracks upon the pledge that the billet money shall be paid to them, we may succeed in getting what we require. At all events, nothing is more clear than that the billeting system to a great extent keeps back the full development of the Militia. I am far from accepting for one moment the strictures which have been made on the Militia by persons who have written about its being an inferior force. All I can say is, I have inspected regiment after regiment of the Militia, and have been astonished to see that they are so good as they are, considering the difficulties they have to encounter. I have seen regiments perform the manœuvres, ordered after a month's training almost as well as some regiments of the Line, but they are not capable of doing more, and from the shortness of training would fail if called upon; longer training, therefore, is necessary. But, as far as it goes, the foundation of a strict system of regimental drill has been laid, and if the regiments are in a very short time called out they will be quickly available to take their place. It is an admirable force, and deserves every credit an Officer of the Army can give it. There is a great deal more I should have liked to have said with regard to this subject, but I will not detain you at this late hour. On your part I am sure you will allow me to thank Colonel Leahy for the paper he has read.

LECTURE.

Friday, May 12th, 1871.

FIELD-MARSHAL H.R.H. THE DUKE OF CAMBRIDGE, K.G., G.C.B., &c., &c., Commanding-in-Chief, President of the Institution, in the Chair.

THE MILITARY SYSTEMS OF FRANCE AND PRUSSIA IN 1870.

By Capt. C. B. BRACKENBURY, Royal Artillery.

THERE are certain little reddish-brown insects called Amazon Ants, which may be seen on fine summer evenings, after sunset, marching in serried columns to the attack of neighbouring nests. They are very brave; their discipline and knowledge of the art of war are wonderful, so also is their strength, when compared with the size of the little bodies which can perform such marvellous military feats. The invaders press steadily on, and attack with a world of resolution the nest of their chosen enemy. In vain do the warriors opposed to them resist their determined onset. Many are killed on both sides, but the result is almost always the same. The Amazons succeed in overcoming all resistance, and enter the dwelling places of the beaten foe. They run swiftly through galleries, and peer into every corner until they have found the intended booty; then issue forth and wend their way homeward rejoicing, each one carrying very gently a nymph or larva forcibly abducted from the nest. Arrived at their own hill-fortress, they deliver the load to ant slaves, who tend the soft living creatures committed to their charge with the greatest care and kindness. As the captives grow up to ant stature they become the slaves of the conquerors and perform all the duties of servants. They become builders and repairers of their masters' houses, provide them with food, and act the part of manufacturers and tradesmen in the colony. But mark what happens. Bye-and-bye the Amazons become so lazy, luxurious, and unhelpful that they are no longer fit even for war. They can neither build ant-houses nor find ant food, nor even take charge of their own young. If their old nest is destroyed or becomes unservice-

able from age, the slothful soldiers have no spirit to decide on migration, no energy to carry it into effect. Their antships are above all that sort of thing; so the slaves prepare the new house, and, when it is ready, carry their degenerate masters to it in their mandibles, just as they themselves were originally carried from their old homes. Hubert captured some of the masters and gave them food. They would not raise it to their mouths. Almost in despair, he bethought him at last of putting a slave in among the perishing warriors. In a moment she comprehended the situation, and set herself to clear away the dead and feed the dying. They received her attentions graciously, and permitted her to save the colony. Now, as these slaves are workers but not fighters, are, in truth, somewhat faint-hearted people in the presence of danger, there can be no doubt what would happen if the once mighty nation were invaded by a host made of sterner stuff and yet uncorrupted by luxury.

The fate of these insects—the same creatures as were chosen by Solomon to represent the type of industry—has again and again, in the world's history fallen upon great nations, and yet men can hardly be persuaded that it will inevitably happen under the same conditions. Lord Bacon, one of the wisest of mankind, writes,—"In the youth of "a state, arms do flourish; in the middle age of a state, learning; and "then both of them together for a time; in the declining age of a "state, mechanical arts and merchandize." "When a warlike state "grows soft and effeminate, they may be sure of a war; for commonly "such states have grown rich in the time of their degenerating; and "so the prey inviteth and their decay in valour encourageth a war." Great is the power of money, and none know what that power is better than the vast majority who are scantily provided with gold. But money can neither buy brave and honest hearts nor make up for the want of them, and a time of crisis is sure to come when these and not gold will be found to be the true wealth of a nation.

I shall presently have the honour of laying before you some details of the particulars in which I conceive that the Prussian military system is, and has long been, superior to that of the French, but they are to be regarded only as the inevitable results of great differences in principles. Prussia is poor, but her people, the greater number of whom have to wring a scanty subsistence from an infertile soil, are frugal, temperate, and not given to the softer vices. They are more hardy than the French on an average, their Royal House and aristocracy have been taught in the school of adversity. From the time when Frederick bribed and even kidnapped giants to make grenadiers and husbands withal, the main design of Prussian economy has been to breed men with bodies and brains; then, having got them, to make the best use of them for the benefit of the country. Wherever you search in Prussia, in office, factory, University, or Army, you will find the same ever present virtues—simplicity, organization, and discipline. But above all, every man in Prussia, from the Sovereign to the "boots" at an inn, has been taught and encouraged to think for himself. This is especially true of the Army and its Officers, the result being the

production of a group of men in high military command, possessing, each one of them, sound soldier-like qualities and brilliant talents. The people do not always like these men; indeed, there is a good deal of dread mingling with their feelings of respect, but then the respect is genuine and hearty. They know that the leaders of the nation in war are masters of their profession, and not a chance nor a life will be thrown away. Therefore they go forth to fight without murmuring, though somewhat sadly; therefore their discipline is perfect, for who would dream of cherishing rebellious feelings against men in whom alone confidence may be most worthily reposed? Above the heads of the Generals is a Royal House, whose members are among the hardest working and most respected human units in the German empire. In the constitutional struggles over Army organization, the people and the Parliament learned the strength of the Prussian King and his Minister, so that they were not unready to give praise when the measures they had resisted were found to have prepared the successes of 1866 and rendered possible at last the dream of ages,—the highest hope of patriots,—the unity of Germany.

Only one nation stood between the Germans and their object. Russia was open to an arrangement; Austria wanted nothing but to be let alone for awhile, being too much occupied with internal affairs to interfere in Europe. England had plainly declared her policy to be that which Prussian writers are rather too fond of calling one of effacement. The minor powers could do nothing but tremble at home, and watch events. Only France was determinately hostile to German unity, so France was the declared enemy of the German people. It mattered little how the rupture was to come. Nothing was better understood on the continent than that Europe was too small for the pretensions of the two great rivals, and that sooner or later there must be war between them. They were both preparing for the inevitable shock, and we will now glance over their methods of preparation.

The military organization of Prussia,—and all North Germany had to constitute itself on the same model,—is that which has been often called arming the nation. In one sense the expression is true, but it would be very apt to lead us astray, unless we mark how very different was the armament of North Germany for war from that of Switzerland, America, or the curious condition of helplessness in which some writers and speakers would have placed England at the time when the Volunteer movement was most popular. What these gentlemen wished to do was to substitute armed masses for an army. What the Prussians have been doing since 1807 was to bring the whole nation into the Army. Bear with me while I recapitulate briefly the steps trodden by the great men who have made the German army what it is to-day.

By the terms of the peace of Tilsit in 1807, Prussia was reduced to half her former proportions, and less than half her population, while she was bound to diminish her army, and never keep under her standards more than 42,000 men, her reduced population being only about 4,000,000 souls. The King entrusted the re-organization of the military forces to Scharnhorst and Gneisen, who commenced by abolishing

the old slave-like system of "discipline," falsely so-called. The penal laws were altered; flogging abolished for all men who had not sunk into a second-class; a feeling of personal honour was inculcated among the soldiers. No man could become an Officer until he had learned the duties of the private soldiers, passed two examinations, and been elected by the corps of Officers to take his place among them. All allowances for birth were abolished, and every encouragement was given to those who would cultivate scientific pursuits. The men were allowed under certain conditions to go on furlough, after a service of some months in the ranks, so that others could be trained, and so large a proportion availed themselves of the permission that in 1813 all the regiments could be brought to their full strength, and 51 new battalions formed. By the addition of 10,000 Volunteers, and the establishment (on the 17th March, 1813) of an enthusiastic but inexperienced Landwehr or Militia, numbering 120,000, Prussia was enabled to put in the field when August came, a force of 250,000 fighting men. But how different were these from the men of 1870! Enthusiasm there was in abundance, but even later, in 1815, they had not attained the solidity or steady discipline necessary for great achievements. They were unsuccessful at Ligny, and Wellington reported that though the Prussian Army started with double his force, by the time they reached Paris he was as strong as they were, although he had received no reinforcements, and they had not lost many in battle. But their discipline was so relaxed that their numbers rapidly diminished during the march. The system of individual plunder had been the ruin of the French Army, and would be the destruction of the Prussian. Clearly this was not a force fit to take military command of Europe, as the German Army has now virtually done. Not yet had the country rallied sufficiently from the weakness into which it had been led by the pedantry of those who had contented themselves with embalming the corpse of the dead system of Frederick. A good Army cannot be formed suddenly any more than, being good, will it remain at the same point. It must breathe the same air as the nation, and live the same life, or it can never fulfil the wants of the nation when the hour of crisis arises. No degenerate nation can possibly have a trustworthy Army.

Though not perfectly satisfactory, the landwehr men had shown that they could fight. Since Prussia was poor, and even after the restoration of territory consequent on the general peace, had a population hardly reaching ten and a-half millions, it was decided to base her military system on this principle, that the standing Army should be only a school through which all men capable of bearing arms should pass, but that the Landwehr should form the bulk of the troops brought out for service in case of war. Called to the standards at the age of 20, each Prussian had to serve three years in the standing Army, two in the reserve, seven in the first ban of the Landwehr, and seven in the second ban. Even then he was liable for a further period of ten years, to be called out as a member of the Landsturm, in case of emergency. Let us mark this carefully. The standing Army with its reserves held

the Prussian only five years. He remained in the Landwehr 14, and in the Landsturm 10 years. The standing Army was considered only as a sort of training school, and the first ban of the Landwehr was just as much a part of the field Army in war as the standing Army itself, though intended to form the depôts from which the troops in first line were supplied.

Now it is a remarkable fact that most persons who talked and wrote about the Prussian successes in 1866 imagined the Army to be composed and trained in the manner just related. But it was not so. The wars of 1848 and 1849, and the mobilizations of 1850 and 1859, showed that the spirit of the Landwehr was not to be trusted. Trusted it might probably have been in a war against the natural enemy—France, but not for the grand struggle for supremacy in Germany. Besides this, the population had increased so as to be able to furnish an annual contingent of 63,000 men, instead of the usual number taken, namely 40,000. The present Emperor of Germany, while regent in 1859-60, ordered that a re-organization of the Army should take place, adding to the numbers drawn every year into the standing Army, and shortening the term of service in the Landwehr, while lengthening that in the reserves. The recruits were therefore increased by one-half, and had to serve seven years before they were clear of the standing Army. The landwehr were to serve for seven years only, and the first ban was no longer to form part of the field Army, but to be placed in garrisons, together with some of the reserves. By such means the standing Army would become about 500,000 men, and the temper of the Landwehr might be disregarded. Englishmen are not likely to forget the constitutional struggle which arose on these questions. The Parliament would not grant the powers demanded by King William when he placed before them in 1860-61 the plan of his new law. By what process the denied boon was taken matters not now. The fact is that step by step the standing Army was increased by 36 infantry regiments, 9 fusilier battalions, 10 cavalry regiments, 9 companies of garrison artillery, 18 pioneer companies, and 9 battalions of military train. Henceforth the Landwehr was no longer the great institution of Prussia, and only the younger men belonging to it were called out at all in 1866. The changes were not made without much indignant opposition, and there can be little doubt that any failure in the war against Austria would have cost the King his throne. Men are not yet so changed by civilization as to have lost their admiration for military success. Philosophers may think and write as they please. They cannot deny that the Prussian Parliament forgave King William all that he had done contrary to the law, because he had given them military glory.

No sooner was the question of Prussia's supremacy in Germany settled, than her wise rulers set themselves to the task of Army Reform, strange as it may appear that reform should be necessary after such great achievements. But the new provinces had to be organized, and, besides, the increase of the standing Army of Prussia and the reduction of the Landwehr, had introduced some confusion in the rela-

tion of the Line regiments to their Landwehr battalions, and their districts for recruiting. The increase of population had not been the same in all the districts. Railways, too, had revolutionized the system of communications, and it was necessary to bring the whole machine into a condition for harmonious action. The first step was to redistribute the country into districts, so numbered and arranged that each *corps d'armée* and regiment should have its particular district corresponding with the civil divisions of the country. The regiment is scarcely ever moved from its own district, and it naturally follows that the Reserves (men on furlough) and Landwehr battalions belonging to the regiment are on the spot and ready for instant mobilization. Thus the whole North German country was divided into twelve *corps d'armée* districts, and each of these was divided into four sub-districts, corresponding with the four brigades of the corps. Then the sub-districts were again divided into districts of Landwehr battalions. There are generally two Landwehr battalions to each regiment, so there are, as a rule, four Landwehr battalion districts within each brigade district. We shall see presently how the whole machine works for recruiting and mobilization.

On the 9th November, 1867, a new development of the Prussian military system took place, including this time the whole of North Germany. The main features of the law were as follow:—

Every North German, with the exception of a few specially exempted classes, was liable to serve for the help of his country in war.

The armed force of the Confederation comprised first the "standing Army," divided into Active Army, Reserve, and Landwehr. Here it is to be remarked that the Landwehr is no longer a Militia, but part of the standing Army. The second division of the armed force was the Navy, comprising the Fleet and the Seewehr. The third division was the Landsturm.

Like all the rest of the Army administration, the Budget is characterized by the most extreme simplicity. The active Army may by law amount to 1 per cent. of the whole population of the country, and the money required is estimated at 225 thalers, about £33 15*s.* per head of the permissible active Army. The law granting this money is voted for a number of years, so the War Minister has only to estimate the population, divide it by 100 for the number of men serving, and then multiply by 225 to get the figure representing the number of thalers he has a right to take out of the public revenue for the year. For any extraordinary expenditure, such as re-armament of artillery or infantry, coast defence, &c., he goes to Parliament with a supplementary Estimate. If the money is refused, he can take any accumulations in the military chest, or he can dismiss men to their homes some months before their three years' service with the colours is over, or, finally, he can take fewer recruits for the year. Thus he has far more power than is granted to any Minister in England, France, or Austria. He does habitually, and for the whole Army, what Mr. Cardwell did last year when he asked for 20,000 additional men, and estimated his money

requirements at £2,000,000, or £100 per man. But there is this difference, that the North German Minister can get exactly as many men as he wants—no less and no more—whereas Mr. Cardwell had no certainty as to how many he could really find. I will now try to sketch shortly the process of recruiting in North Germany, and I cannot but remark that the system seems perfectly possible to be adopted in England, always excepting the forced service, and even that is possible for the Militia.

In each corps district, the Corps Commander, together with the President of the Civil Government and his chief officials, form a Commission. In each brigade district is an inferior Commission, formed from the Brigade Commander and the civil official of corresponding rank. In each "circle," or Landwehr battalion district, is a still lower Commission, formed by the Landwehr Commander and corresponding civil official, or director of police, together with extra members, namely, an infantry Officer, four landed proprietors (two of country, two of town property), and a Staff Surgeon, the last having no vote. Above all, there are Commissioners specially appointed by the Minister of War and the Interior.

Before the 15th of April in each year, the Minister of War receives reports from the provinces, stating the number of men required to complete each regiment, &c., and he issues in return his directions as to the number of recruits he wishes to have called up both for Army and Navy. Then the various Commissions above named decide whether each small Landwehr district can supply the proper number. If not, the deficiency is made up from the other districts of the same brigade. But there are generally more than enough, in which case lots are drawn among those liable for the year, and the youths drawing the highest numbers are put back into the Ersatz Reserve, and are liable to be called at any time to make up deficiencies.

But how are all the men of proper age brought together and selected? We shall see. In January, the clergy and officials in charge of registers send in lists of all youths who have reached 17 years of age. The young men have to present themselves to the local civil authorities before the 1st of February, and alphabetical lists of their names are made. They now begin to be liable for the Landsturm; or they may, if they like, become "one year Volunteers." This is the part usually chosen by young men of education, who do not wish to become Officers in the active Army. By volunteering for one year, providing their own equipment, and passing two examinations, they fall into the Reserve at 18 years old, and remain in it for six years. They have the right at first of choosing their own regiment. In peace they need not join their regiment before their 23rd year, but they must pass their examination before their 20th year. Those who do not volunteer are dismissed to their homes, but called up again in their 21st year, examined medically in May or June by the circle, or lowest of the commissions, and divided into classes. Some are rejected or exempted for various reasons, others held over till next year, and upon the rest the commissioners make remarks as to their adaptability for

special branches. Then come the brigade district commissioners, accompanied by the adjutant of the brigade, an Officer of the Guards, and a surgeon.

There is another medical examination, after which the guardsman selects any one he chooses for service in his corps, which is supplied indiscriminately from all districts. Men not taken into the service for any reason, yet not rejected absolutely for all military duty, both in peace and war, fall into the Ersatz Reserve, whence they are liable to be called in case of war as recruits for the Reserves. The recruits have some of the articles of war read to them, and are henceforth under military law, though they do not join until October. If they have lost work by their selection for the Army, they can claim the right to join the standards at once, if they please. Then come the three years (often reduced by several months) in the active Army, four years in the Reserve, and five in the Landwehr, after these the Landsturm, till 42 years of age. During the four years' service in the Reserve, the men have all the freedom of civilians except that they are bound to take part in two manœuvres, neither of which may exceed eight weeks. During the Landwehr service they may be called twice for a few days' drill. A man who wishes to re-engage for a further period after the three years' active service, may do so if his Colonel consents, and he himself has shown a probability of his becoming a non-commissioned Officer. A slight addition is made to the pay in such cases, and nearly all the subordinate posts in the Civil Departments are open to non-commissioned Officers, who have been re-engaged and served altogether 12 years. They have the preference over civilians, but must pass an examination, if required. The one year volunteers are examined after their year of service, and receive certificates stating whether they are qualified to be Officers, non-commissioned Officers, or privates in the Landwehr.

As the cavalry training takes longer than that of the infantry, great inducements are offered to young men to volunteer to serve four years instead of three in that branch of the service. Such are not called out for manœuvres at all while in the Reserve, and have only to pass three years in the Landwehr.

The Reserves are principally officered by gentlemen who have held commissions in the active service. A few soldiers, who have distinguished themselves by personal bravery before the enemy, and a few others who have received certificates from their regiment as to their military and *social* qualifications, are appointed Officers of the Reserve. Similarly the Landwehr is commanded either by old Reserve Officers, or by promoted men of the Landwehr, who have passed examinations, served with and received certificates, military and social, from a regiment of the line. This necessity of being elected by a regiment to the position of an Officer, no matter what examinations may have been passed, is a great feature of the Prussian military system, and extends, as a principle, throughout the whole service. When a candidate has been so elected, the "guinea stamp" has been put upon him, showing him to be not only good metal, but up to a certain standard. No inconvenience is found to result from it, and I would venture to ask whether some such

principle might not be adopted with advantage in England. It is agreed on all hands that Officers should be gentlemen. There are some who fear for the social tone of the Army when purchase is abolished. Would not election in addition to examinations secure all that is wanted? The chief difficulty would be the want of connection between districts —counties, if you please—and regiments in the modern English service, but both principle and expediency are against the continuance of the no-how system of recruiting, and I believe that its end is near at hand. If regiments were really localized, and passed their home service always in their own districts, one difficulty at least would be removed from the path of the Minister of War who does not now even know how to find recruits at all.

See now to what point we have got in the Prussian system. A certain district of the country contains its own corps complete as an army in every respect. Even each regiment has its district where it lives, surrounded by the friends of the soldiers, together with the reserves which are to reinforce it in war, and the Landwehr, who are to take its place in the fortresses. If a father serves in a regiment, his sons serve there too some day. Family traditions are kept up, and home influences are not denied to the soldier. The Officers are well known throughout the country side, and no one out of harmony can be admitted to the regiment except by carelessness on the part of the Officers already holding commissions in it. Most of the civil posts in the district are before the men as possible rewards for good conduct and cultivation of talents, and in the worst case there is always the old regiment at hand to help those who have passed through it, and since fallen into difficulties. Thus there cannot but be good feeling between the soldiers and the civil population, and the private is never quite out of reach of the tender advice of a mother and the softening influences of home.

One day there comes a rumour that the French Emperor is threatening Germany with invasion. The hearts of the house-mothers die within them, as they think of the gallant sons, who must go forth to do battle for Germany. But there is not a fire-side in the country where the young men of the reserves do not listen to nightly stories of the cruel oppressions of Napoleon the First, or hear how the elder their grandfather marched through the battles in Belgium to the streets of Paris. The first chill of dread is succeeded by a growing enthusiasm, and when it is known that the short command, "mobilize your corps" has come down from Berlin, it is not the boys only who are glad, nor are even the treble voices of the women wanting to sharpen the tone of "the watch on the Rhine".

But there is neither hurry nor confusion—Not a word more from the War Office than "mobilize your corps." Not a word more from the corps commander than "mobilize your regiment." If the telegraph will not reach every regiment or official, mounted men are sent to pass it on. The fiery cross has been uplifted, and the clans gather for the fray.

Every commander of a district Landwehr battalion knows who are

the men to be called out instantly from the reserve: nay, he has in some cases, letters already written and only requiring to be despatched. In other cases he sends the orders through the parochial authorities. Twenty-four hours' law is given to arrange household affairs and take farewell of friends, and then the men present themselves at the head-quarters of the Landwehr battalion. A doctor examines them to see if they are fit to fight for their country, and they are forwarded in charge of an Officer or non-commissioned Officer to the head-quarters of the regiment where the whole of their equipment is already waiting for them, for it is never suffered that the peace army be considered otherwise than as the training school for war, and the guardian of all that is wanted to equip the war army.

To complete the infantry regiment, about 500 reserve men per battalion, or 1,500 men per regiment are sent to serve with the colours at once. The remaining reserves, together with some of the youngest Landwehr men, are formed into a depôt battalion about 1,000 strong; the rest of the Landwehr go to the fortresses, always, so far as is possible, in their own district. A cavalry regiment only requires about 40 reserve men, because it is kept nearly up to its full strength in peace. The bulk of the cavalry reserves go to guard train and lines of communication. I have not time to follow through the details of mobilization for all arms. It must suffice to say that the reserve men left in the depôt battalion work at the drills and duties they have as yet had little time to forget since they served with their regiment, and await a call to the front. That call comes as soon as the regiment has lost one-tenth of its men, and comes direct from the regiment, not from any War Office or other cold-hearted institution. "Comrades, we have suffered and need help," is heard by the brothers and friends of the men before the enemy, and the reserves go, not to strangers, but to stand beside those whom they have known all their lives. I am at a loss to conceive what is meant by a good regimental system if this be not one. Officers, every one of whom has been elected into the regiment by those who choose him as a comrade, and men all from the same district, so that there is none so humble but will have his gallant deeds told in his village by eye witnesses—none so friendless, but that the tribute of a tear will be paid to his untimely fall. As I wrote these words I opened an English Army List at a venture, and saw at the head of the two pages the names of six regiments: 36th Herefordshire, 37th North Hampshire, 38th 1st Staffordshire, 39th Dorsetshire, 40th 2nd Somersetshire, 41st The Welsh. Once these words meant something; now they but recall memories of a better time, when the counties of England were proud to send the flower of their youth to the grandest test of manliness—war for the good of their country.

Fain would I linger over this part of the subject, and tell again, as has been told before, how the patriotism of Germany does not stop at the sacrifice of her children, but extends to the furnishing of horses to the regiments or train, at prices fixed by a commission, and not to be paid till the end of the war; how the families of the absent soldiers are cared for by the parishes, not grudgingly, but as a simple duty;

for though in peace a merciful law exempts the only sons of widows, and the chief support of fathers and mothers unable to support themselves, even these must be given as a sacrifice to the inexorable requirements of war; how subscriptions are opened for the sick and wounded, who receive no comforts except freewill offerings, and how the whole district is busy preparing supplies of food and clothing, which are sent straight to the regiment dearest to the hearts of the people. But it is time to turn the page, and see what state of preparation for war France was in when she threw down the gauntlet.

The main feature of the organization we have just cursorily examined, is that it is an organization for war. That which General Gouvion St. Cyr devised for the French Army in 1818 was, as has been pointed out in the prophetical Jeremiad of General Trochu, an organization for peace. Nominally the soldiers were to be recruited by voluntary enlistment, conscription was to supply deficiencies. Practically, almost the whole Army was taken by conscription. The exhaustion of Europe, and especially of France, rendered war highly improbable, and it was not until 1832 that any new law was required for the Army. Then a fierce wordy controversy ended in the law framed by Marshal Soult, a compromise between the two opposite opinions. According to its provisions a conscript might himself find a substitute if he could. The State asked no questions so long as the number of men required were found, and all fit for service. Exchanges were made among friends, perhaps even brothers, but the principle that it was honourable to serve the State as a soldier was not lost sight of. The Officers were gentlemen of rank, accustomed to command, or men who had actually distinguished themselves in war. But Louis Philippe introduced commercial ideas even into the Army, and the laws of 1834–36 made commissions of Officers no longer to be considered as honours held at the pleasure of the Crown, but as property which could not be taken away except for misconduct. Unfortunately for the country the men of good family, who adopted the profession of arms as a career after the Restoration, and worked hard to fit themselves for war, refused to serve under Louis Philippe, and left the Army in great numbers. It is impossible for a just historian not to hold them responsible for some of the commercial spirit which began to surge down upon the Army, and finally crushed all its grandeur and most of its manliness. For if the advocates of high principles break up their ranks and go home because they are defeated, who is there even to delay the onward march of selfish mediocrity? The aristocracy of the country, the natural leaders in time of foreign strife, had left the service. The King discouraged the idea of war and encouraged commerce. Naturally, the best men of the middle classes adopted careers in which fortunes could be made. What could follow but a gradual lowering of the position of Officers. Commissions came to be looked upon not as honourable posts to be held for the good of king and country, but as first steps towards the attainment of decent incomes and social position. It was not long, however, before the Officer, sprung from the lower middle class, found himself and his ideas somewhat out of place in a

profession which is nothing if it be not manly and noble in tone, while he saw his brother, the grocer, making a fortune. Disappointed and jealous, seeing no prospect before him of advancement by war, he began to cast about him for some means of enriching himself by currying favour with men in power. He was not even a free shopkeeper, but a money grubber, who had learned to cringe for appointment to some better post or other, whence he would not be driven if servility could keep him there. Doubtless there were numerous exceptions; these must always be taken for granted in describing the manners of a large class. But on the whole the grand, bold, military spirit, with its unselfishness, exact truth, and nice sense of personal dignity and honour, qualities which go so well with the strictest military obedience, had given place to slavish self-seeking and a dog-like spirit, ready to lick the hand that strikes—but feeds. Not the bravest, the truest, and the best were placed in positions of trust and honour, but those who looked most sharply after their own interests, and knew best how to court favour.

Thus was the Army and the nation gradually prepared for the law of 1855, by which the fall of military service from the high position it had formerly held was recognized. It enacted that men drawn by conscription might buy exemption for a sum of money paid to the State. Instantly agencies sprang up throughout the country, to lend money for such purposes, and a soldier serving in the ranks began to be regarded in a commercial age as a man not only without money but without credit. Frequent promotions from the ranks to the grade of Officer kept down the tone of the commissioned, and the French Army was evidently pursuing a downward career. I am not speaking only from my own judgment, but that of some of the best and most noble French Officers whom I have lately met, and I pray you especially to remember that what I am about to add is not merely my own opinion, but one very common across the Channel just now.

Some forty years ago France became possessed with the desire of having Algeria as a dependent colony, both as commanding the southern shore of the Mediterranean, and as, forsooth, a school of war. At first it was a good military ground, fertile in marches and combats. Certain Officers were noticed for their bravery and skill, and deservedly rewarded. But when French power was once established, the school became a playground, or, even worse—a place of practice for intrigue. Life there was a condition of peace, with the disorder of war, and without sufficient danger to check the demoralising effect of occupation by conquerors. Discipline became lax there, as it did in India under similar conditions, but there came also a gradual sinking into terrible demoralization and vices, which are still called in France "Algerian," because no one dare otherwise name them. Thus the Army steadily degenerated, and the few men who dared to send forth notes of warning were speedily crushed by popular opinion. Who can wonder that such an Army showed itself untrustworthy in 1848, and proved a broken reed to the hand that leant upon it? When Louis Napoleon became President of the Republic, his first thought was

to gain the goodwill of the Army. It may be remembered that he gave banquets and gratuities to the soldiers, and made his presence among them to be looked upon always as the forerunner of some indulgence or other. But he could not gain the goodwill of the natural military leaders. It was long before they came in at all, and then only in scanty numbers, and with ideas of reform—such reform as was incompatible with the Imperial system, for it involved the gathering tighter the reins of discipline, and the substitution of real work as the only road to promotion, instead of subserviency to the claims of the dynasty. The first step to promotion was to gain the interest of some Court favourite; the second, to be sent to Algeria and perform some feat of arms against undisciplined native warriors, so that the name of the aspirant might be brought before the public. The luxury of the Court became reflected in the Army. The Generals, often risen from the ranks, used their comparatively high resources for self-indulgence. The junior Officers and men followed the evil example as far as their means allowed. Luxury must be comparative, and it is not to be supposed that the pay of the French *militaire* enabled him to purchase any refined pleasures, unless the theatre be considered so; but each one in his own sphere learned to prefer self-indulgence to manly self-denial, and Algerian vices became fatal to all self-respect. The outside appearance of the Army was fair in seeming, but outpost duties, gaining intelligence, and all the severer work of soldiers were neglected. I had military friends in Paris, belonging to armies of other Powers, and I can vouch for the fact that their reports of the condition of things were as unfavourable as those from Berlin were the reverse; and this, even after 1866, when France was avowedly preparing for war. The Emperor himself endeavoured to introduce certain reforms in organization and tactics, but the military hierarchy on whose support his throne rested, were not to be easily moved and he dared not offend them. They, like the Germans, considered themselves to be in the presence of an enemy, but unlike the Germans, they despised their antagonists. Nothing can be more fatal, than unreasoning confidence in success, because it seems impossible that one's pride may have a fall, yet this was exactly the condition of the French Army under Napoleon the Third. The lesson has come to them. May they make the most of it, as Prussia did in 1807.

Hitherto we have spoken only of the moral degeneration of the French Army. It is time to enter into some details of the system of obtaining recruits, organizing and preparing them for war. The law of 1832 (Marshal Soult's) was based upon that of Gouvion St. Cyr in 1818. Nominally the recruitment was by voluntary enlistment, practically by conscription. The annual contingent was voted by the Legislature and might vary considerably. The conscript was taken at twenty years of age, served seven years nominally with the colours, but usually in part with his regiment and the rest on furlough in the Reserve, which was further increased by the conscripts drawn each year, but not required to fill up the active army, and, therefore, allowed to remain at home on furlough. The latter class were liable to be called out occasion-

ally for drill, but the call was seldom given. A law of 1831, and a later one in 1851, provided for a mobile national guard, to be drawn from the sedentary national guard to defend the soil of France in case of invasion. It requires little thought to prove that reserves consisting chiefly of young men seldom or never drilled, would be of little use, and the Mobile Guard of still less. The laws were unpractical, and remained dead letters to all intents and purposes, as far as the reserves and National Mobile Guard were concerned. The Army consisted of men, counting about five or six years' service, and of men bribed by extra pay and bounties to re-engage. Seeing that this was no condition of preparation for war, Napoleon the Third began his measures of reorganization by ordering that such men of the contingent as escaped service in the Army, should not go scot free, but pass a few weeks of each year in "depôts of instruction."

For a long time the annual contingent for all services including navy and gendarmes, had been fixed at 100,000 men of whom 79,000 only were really disposable for the Army. By the law of 1832 these would be divided into two portions, one to supply the wants of the Army, which would theoretically require 43,000 recruits, the other portion would go home and have only a slight amount of drill in the depôts. But a new element was introduced into the question by the law of 1855, encouraging re-engagements with extra pay. Many men remained, so that there was not room for the usual number of youths to join. Furthermore, the bad principle of escape by payment of a sum of money, was working so disastrously, that at last, only 59,000 were called each year, of whom 36,000 went home on furlough, 23,000 remaining with the colours. That is to say, that only 23,000 men annually were learning to be soldiers in France. Nor was this all, for the outgoing soldiers were freed on the 31st December, while forms of one sort or another so delayed the incoming of the recruits, that the drill season was over before they joined, and they were, for their first year, useless for war purposes. All these causes combined to reduce the effective of the Army, and that so thoroughly, that in the Crimean and Italian wars, it was found necessary to call up annual contingents of 140,000 men, thereby pressing hardly on the population of the country, and unfairly on those who happened to be of a certain age, while failing to afford soldiers immediately ready for service.

The year 1859 was a memorable one in the military history of Europe. France, after drawing 140,000 men for three successive years during the Crimean war, had nominally an effective force of 639,000 soldiers. Practically all that the Emperor was able to dispose of amounted to 300,000 when the necessary garrisons were subtracted from the total force. At the battle of Solferino only 107,000 Frenchmen could be put in line against Austria, and the result of the battle was much too uncertain for a while to justify Napoleon III in continuing the war, even with Italy for an ally. Something was clearly wrong here. But something was also wrong further north, for it was now that Prussia discovered how cumbrous was the weight of her huge Landwehr force, and how difficult to move. These faults in

system were acknowledged in both countries. In Prussia, as we have seen, the King risked everything to set his army in perfect order, even against the will of the people. But the Emperor of the French lived on the goodwill of the Marshals, and the suffrages of the country classes, always hardest hit by conscription. So the talk came to nothing, and Prussia was allowed gradually to work herself into the position of the first military power in Europe. It is well known that in 1866 the army of France was unfit to take the field, being unprovided with stores for a campaign. Her self-love was wounded, and henceforth the work of re-organization began in earnest.

Marshal Niel is responsible for the law of 1868, which was based on the principle that it is better to have an active peace army of short service men with good reserves than of long service men with no soldiers behind them. Only his influence could have carried it against the opposition it encountered in the Chamber. The shameful action of the State in taking money from a conscript instead of service was abolished, though he might still find a substitute if he were willing to give vicarious service. Bounties for re-engaged men were also abolished, as it had been decided by general concurrence of opinion that soldiers do not become more valuable for war, but less so after ten years' service, and those retained in the ranks fill up places and prevent young men coming in to learn their duties as soldiers. But since good and clever Non-commissioned Officers are always worth retaining, the Prussian plan was adopted of promising civil employment to such as should complete a re-engagement of five years. The term of service for all soldiers was fixed at nine years, only five of which were to be with the colours, the remainder with the reserve. Besides these the reserve took all the men out of 100,000 conscripts who were not required for the active army. But the main feature of the law was the institution of a mobile national guard, consisting of all the men fit for service each year who escaped, by any means whatever, conscription for the regular army, and who were now obliged to give five years' service in the Mobile Guard. They were intended to supply the place of the German Landwehr and Ersatz reserve together; their Officers were chosen by the Emperor chiefly from among the retired Officers of the Regular Army. By making the law retrospective as far as 1864, the men who had escaped conscription in that year now owed two years' service to the State in the Mobile Guard, those of 1865 owed three years, and so on. Thus at once 550,000 men were added to the defensive forces of France, but their fifteen days' drill annually would at the best, after several years, turn out very poor soldiers compared with the Prussian Landwehr men, while the nature of French military organization gave no connection between regiments of the Line and of the Guard Mobile. The latter had, therefore, in it the dangerous elements without the excellent qualities of the Landwehr. What the Mobile Guard actually did was to free the active Army for the field by garrisoning fortresses. They were worse than useless for every field service, and proclaimed their opinion on that point loudly enough when asked to defend the camp at Chalons. In

1870 the reserve was but in its infancy, and many of the men were entirely untrained. Eventually the whole organization would have furnished an army as large as that of North Germany, but not so well trained. In 1870 even men were wanting.

Thus it appears that in time of war France would be deficient in her number of trained men who could be put in the field; but something even worse remained behind. The organization for calling up the Reserves was terribly deficient. A well known pamphlet, attributed to the Emperor Napoleon the Third, states that he himself was aware that France would be out-numbered, for she could only put 300,000 men in line before the enemy at the commencement of the campaign, while Germany could bring up 550,000. To make up for this numerical inferiority, the author of the pamphlet says that it was necessary by a rapid movement to cross the Rhine, separate South from North Germany, and by the brilliancy of a first success, draw Austria and Italy into alliance with France. The only chance of success for this plan was to be quicker than the Germans in taking the initiative. But now appeared the advantage of the German District Corps organization, and the disadvantage of the scattered system of France, and, permit me to remark, of England up to the present day. No example can be better than the one given in the pamphlet. Strasbourg was one of the places named for a great concentration of troops; 100,000 men were to assemble there. Now the town of Strasbourg and the districts surrounding it contained many men belonging to some of the regiments concentrated in the neighbourhood. Surely common sense will show that these men ought to have been able to join their regiments at once:—ought to have been, but were not. Some of the depôts where lay their uniforms, arms, and accoutrements, were actually in the south of France, and even in Algeria. Instead of the railways being entirely available for a concentrated movement of troops from all quarters, they were partly taken up with the conveyance of men away from the seat of war, in order to bring them back equipped a few days afterwards. The same great mistake, with its attendant consequences, was discovered in the organization of the supply departments. There was much talk about treason, and the breaking down of the Intendance; the truth was that the French people had, previously to the war, been traitors to themselves by their carelessness in not insisting upon a proper organization, with the events of 1866 before their eyes. Furthermore the Emperor, if the pamphlet be indeed his, adds that too little initiative was allowed to the Generals commanding the Departments, and to the Chief Officers of the Intendance. For the smallest matter, he says, a ministerial order was necessary; not even arms could be supplied to the soldiers without an order from Paris. What, then, must have been the pressure and overwork in the War Office? what the distrust and discontent among regimental Officers and men? What at last the despair when, still incomplete and not yet fully organized, the armies of France were caught in the very act of formation?

In all that I have hitherto said concerning the faults of the French military system, not one word has been stronger than those used by

French Officers writing for the information of their own countrymen. The earnest warnings of the veteran and prophet Trochu are now almost household words in England. General Susane, during the siege of Paris, wrote in defence of the French Artillery Corps, which he said had been made a scapegoat by "our sovereign mistress, public opinion." He says that the French Army more than any other army reflects the virtues and vices of the nation from which it springs. I shall take leave to quote some passages from his pamphlet:—

"It is now three years since a general Officer, pre-occupied more "with the fate of Rome than that of Cæsar, alarmed like so many "others by the terrible storm which he perceived rising on the horizon, "unveiled in a celebrated book the wane of the spirit of discipline in "our soldiers, and that of responsibility in the Officers of every grade, "to the very highest. He denounced the tendency of Government to "favour agreeable Officers at the expense of proud and capable ones, "and its preference for the brilliant to the solid, which, in a short "space of time, led to our having in the higher grades infatuated and "absolutely empty heads only, and, in the lower grades, jealous and care-"less hearts. He showed with no less independence the dangers of the "patriotic illusions as regards volunteers, of the *levées en masse* "and other revolutionary legends; respectable legends, no doubt, "if the intention only is taken into account, but which have a great "fault,—that of being legends only. It is also three years since an "experienced, able, and clever Minister endeavoured to show, with the "precautions which his political position obliged him to use, the neces-"sity of prompt measures of defence. He demonstrated the insuffi-"ciency of our *cadres* and of all arms, sought by the institution of the "Garde Nationale Mobile to fill up the terrible deficiency which existed "between our military power and that of our probable adversary, and "desired, above all, to raise the moral level of the defenders of the "country, which had fallen as low as possible, in consequence of a "mode of recruiting that brought into the ranks the sons of the most "destitute families only—the most indifferent to the honour of France.

"At the same time a statesman, whose clear-sightedness and love of "his country no one will contest, and who always separated from his "political allies whenever the Army was under discussion, affirmed "that, in view of the crisis which Prussian ambition was preparing for "Europe, our country could not put her resources to better use than "in devoting them to the development of her military organization.

"General Trochu, Marshal Niel, and Monsieur Thiers spoke to the "deaf."

Further on in the same work General Susane says:—

"As regards the leaders of the Army, some were not fit to give "advice, and could only perceive in the war the opportunity of doing "their duty; the others, true descendants of the Knights of Agincourt, "of Cressy, and Poitiers, went joyfully forward, full of confidence, not "doubting for an instant but that bravery makes up for everything—"that a Gaul is worth ten Germans, and certain that amongst them "there were none but Turennes, and not a single Soubise."

Such being the condition and general organization of the North German and French Armies, it is hardly necessary to say that the organization, in matters of detail, showed the same talent and steadiness of purpose on the one side, the same marks of carelessness on the other. Yet the ears of the soldiers were tickled, and their confidence in success kept up until the time of trial, by exaggerating the importance of certain new weapons such as Chassepôts and Mitrailleuses. As if it were the tools that win battles, and not the men. Undoubtedly the Chassepôt is a very superior weapon to the needle-gun. I have myself no doubt that the mitrailleuse is a very valuable addition to the armament of a nation, if only it is in the hands of men who know how to use it. I have no doubt, also, that the superiority of the Prussian field guns was immensely exaggerated, and that there would have been little difference in the result had the bronze muzzle-loaders been in the hands of the Germans, and the steel breech-loaders in those of the French. Putting the various weapons together, and striking an average, the French had a decided advantage, which only failed to be of use to them because they were not wise enough to avoid wasting their ammunition, and not sufficiently masters of tactics to place themselves and their weapons in the best positions.

On the subject of tactics a long controversy has been waged for several years between French and Prussian writers. Prince Frederick Charles observed long ago the necessity for giving greater mobility to the infantry than was possible by stiff formation of battalions in line. The French keep the battalion, but give looseness to it by allowing a considerable latitude to the individual soldier. The Prussian way of meeting the difficulty was to divide each battalion into four companies, and make the Captains mounted Officers with as much power of initiative and control over their men as if they were Commanders of battalions. The French method of fighting may be called loose, the Prussian line in a pitched battle is not so much loose as flexible, each formation has its peculiar advantages and disadvantages, both require well trained, intelligent, and highly disciplined soldiers having full confidence in their Officers. The last qualification was present to a high degree in the Prussian Army but not in the French.

There are two more features of the North German system, in which it is clearly and decidedly better than the French.—The organization of the lines of communications and the autumn manœuvres. When a German Army moves forward to engage its enemy, it leaves behind it a perfect machinery for the supply of its wants and the guardianship of its communications with home. Not a man is taken away from the fighting troops to guard the roads and railways. No matter how far the Army may penetrate, its only losses are those caused by wounds or pestilence. Its Commander has never to look back with fear lest the depôts of provisions and ammunition should be ill-supplied. It is not his business, but that of a department called the Etappen Department, which occupies the line of communications as fast as the fighting men extend it. Each corps district at home is sending stores and clothing to the great Etappen line of the Army. They are forwarded along

that line till close to the front, and then the Etappen Department of the corps receives and distributes them. The honourable, but less dangerous, duties of the Etappen lines are performed chiefly by the Landwehr, who have had much practice in such work, and know by experience what is likely to be wanted and how to supply it.

The second peculiar advantage of the Prussian military system is the method of training the troops for war. When the summer drills are over, and the crops are all cut, the men who have hitherto practised their work in battalions, brigades, and divisions, are assembled in corps, and made to manœuvre against each other exactly as in war, except that their weapons are not loaded. Every department has to perform its own functions, while the talents of individual Officers are tested.

All things necessary in war are practised. Outpost and intelligence duties, patrols, and reconnaissance, billeting, and bivouacking.

There are, doubtless, in these manœuvres many actions committed which would not be practicable in war. But such mistakes are generally observed and corrected by the umpires, who are chosen from among the best known Officers, and whose judgment is trusted. Besides, are not all drills, except the very simplest, but practice of manœuvres impossible in war? Just as drills are necessary to bring troops into hand, and teach Officers to handle them, so are the Prussian manœuvres perfectly adapted to bring the men under thought, and to teach Officers to head them.

The French had their great manœuvres, too, but they were, mostly, performed in camp, and were but big drills exercising the memory but not the power of initiative, nor that faculty which, under different forms and under various names, such as design, combination, or imagination, enters so largely into the power of producing good work in the studio of the artist, in the library of the philosopher, and in the tent of the General. I should dwell further on this branch of the subject, which I consider one of the most important of all, but that I see on your list a notice of a paper to be read on "the Prussian system of autumn manœuvres," by Colonel Shute, and I will not trouble you with my poor way of saying what that gallant Officer will put before you much better and more fully.

Last on the list of contrasts between the military systems of France and Prussia, but certainly not least in importance, is the education of Officers. Here, again, the great difference is one of principle. The Frenchman has hitherto been what I cannot but call the victim of a most elaborate and well-devised system of cramming,—that is the Frenchman who is taught at all; for it must be remembered that a large proportion of French Officers rise from the ranks, and are often very ill educated. The Prussian Officer must in every case, except that of promotion for actual bravery in the field before an enemy, spend a certain time learning the regular duties of the soldiers, and, also, pass examinations, both theoretical and practical, besides being elected by the Officers of a regiment. But there is a great difference between the French and Prussian examinations. It is this. The Frenchman has

little time to answer many questions. The Prussian has much time to answer few questions, but the answers must be thought out.

Here are two questions actually set to the students of the Artillery and Engineer school at Berlin in 1868, with the time allowed for them.

I. "What advantages would be gained by the field artillery if the principle of simplicity were to be completely carried out, and why has this not been done?" (Time allowed, one hour.)

II. "The employment of field artillery in engagements in defiles." (One hour and a half.)

Questions, truly, with much in them, but consider how many Officers are there in most countries capable of sitting down to write on either of them for the time given?

Austria, beaten in 1866, set about reforming her military system. Listen to a word or two, written by a man of great talent and ability. one of the few who came out of the war with unsullied character, nay, with much additional brilliancy to his fame. General Kuhn, Minister of War for the Empire, wrote thus in 1868:—

"Experience shows us, therefore, in both of these special educations "(philosophy and mathematics), the remarkable effects of these theories "of philosophers. The history of German philosophy sufficiently shows "this, and that of excellent mathematicians, who, in practical life, are "worth nothing, because they cannot leave their angles and figures in "thinking and acting. All this goes to prove that . . . . . a "satisfactory result can only be obtained by a union of both systems, "or a harmonious development of the mental faculties. It is neces- "sary that the school books should be carefully revised; at present "they are laden with chaff, which burdens the memory too much, and "is blown away by the first wind after we leave school. As regards "history, only such events as will by their example lead the heart to "admire the noble and truly great, need be fully described and illus- "trated."

These are not the words of a sentimental dreamer, but of the hard-headed and brave man, who, with ten thousand soldiers, held the Tyrol against Garibaldi and Medici, though they out-numbered him four to one.

Now hear something from the official instructions for the war schools of Prussia:—

"The acquisition of the positive knowledge necessary for the imme- "diate professional duties of a subaltern Officer, is undoubtedly an "object of the greatest importance, which is to be looked for from the "course of instruction at the war schools. But it must be regarded as "still higher and more lasting advantage to stimulate the power of "grasping principles, and to arouse that strength of reasoning and "intellect which accompanies a young man throughout the whole of "his subsequent career, and is of utility in all stages and phases of life.

"In the system of education at the war schools attention is to be "paid to strengthening, and basing upon moral principles, the senti- "ments of patriotism, loyalty, magnanimity, and self-denial, by which

"an Officer's duties towards his king and country can be fulfilled in "a far higher sense than by a mere mechanical performance of routine "duty.

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"It is consequently necessary at the schools to aim less at a number "of subjects of instruction than at a clear and systematic arrange- "ment of the knowledge acquired, and above all to develope abilities "to the utmost, and to arouse to the greatest possible degree, inde- "pendence of thought, so that reflection may come to the assistance of "memory, and that details which are forgotten with time may be "easily worked out afresh by the exercise of the reasoning faculty; it "should be the object to attain such readiness in employing reflection "and applying the general principles acquired during the course of "instruction, that a young man may be in a position to pursue the "path upon which he has begun to tread, by his own unaided powers, "without the guidance of his instructor."

Such were the main features of the French and German military systems in 1870. I have dwelt less on the evil than on the good, because we all recoil from contemplating the mistakes that led to the bitter suffering over which we grieve. The one was based upon past fame—a breath of wind—and present riches, a golden chain to the spirit of man. The other was based upon self-denial of a whole country, discipline, perfect organization, and development of both mental and moral faculties. Could there be a doubt of the sort of structures which, alone, could be built on such foundations? The French, imposing in appearance, yet no more than an imposture; the German, plain in its exterior features, but solid as the Hartz Mountains. Whether France will at last be wise, free and great, cannot yet be known. Only this much we can see, that the rich shopkeepers of Paris have not heart to stand up like men and put down the mob they detest and fear. Still, I am not otherwise than hopeful that the fires through which the country is passing will purify it. England, now at peace with her neighbours, has time to take thought and decide on the principles of her future military organization. She may—Heaven grant it—take for her motto the words which Shakespeare, the great master of humanity, put into the mouth of no sentimentalist—Harry V, King of England:—

> "By Jove, I am not covetous for gold,
> Nor care I who doth feed upon my cost;
> It yearns me not if men my garments wear,
> Such outward things dwell not in my desires;
> But if it be a sin to covet honour,
> I am the most offending soul alive."

But, if she persists in asserting that she cannot find soldiers enough, while there are more paupers in London than soldiers and sailors together in the United Kingdom;—if she cannot find brains to organize her Army, nor money to pay for the protection of her honour, though she spent more last year upon those very paupers than nearly one-sixth of the North German military budget for the same year;—if the spirit of

gain gets such hold upon us that our natural leaders in war, the aristocracy by birth, cease to enter a service where the soldiers shall only be bought by high bribes, and the Officers shall think more of their emoluments and social position than the greatness and safety of their country, who can doubt that some day the dread saying will be pronounced against us, familiar now as household words, yet of how little moral influence—"Thy money perish with thee, because thou hast thought that the gift of God may be purchased with gold?"

LECTURE.

Friday, May 5th.

GENERAL SIR WILLIAM CODRINGTON, G.C.B., in the Chair.

THE STUDY OF MILITARY SCIENCE IN TIME OF PEACE.

By Lieutenant-Colonel CHARLES C. CHESNEY, R.E.

I SUPPOSE that there is no person present, with any degree of thought, but must have occupied himself in some degree during the last few months with the problem, how did the Prussians form that matchless Army which they possess? It is to that problem I propose chiefly to address myself to-day.

There are two ways, if one may judge from an unbiassed study of history, by which great and successful armies are formed; two ways very distinct in themselves.

One is by a process equivalent to that which we hear of in philosophy as natural selection, a process by which an Army is gradually formed under the pressure of actual experience in the field. By such a process Napoleon obtained the Grand Army which made himself so great. And by such a process Wellington formed the Peninsula Army, whose glories have illustrated our own annals. Wellington, for instance, taking him as a special example, had years wherein to frame his departments carefully, one by one, with that wonderful attention to detail in which perhaps he was never surpassed by any man. He had time to dismiss incompetent Officers, to advance those that were useful to him, to build up day by day what was necessary for his Army in the field: he created, first, divisions that could act singly under trustworthy Officers; and then, finally, though in a kind of tentative and feeble manner comparatively, did he form *corps d'armée* at the end of his career. He had time also to advance in his strategy from small things to great, until from merely defending a few earthworks, he thrust the French, with the final tremendous blow dealt at Vittoria, out of the Peninsula, and himself followed them into their own country, thenceforth destined to bear the burden of invasion in her turn.

Such was the manner in which the Army of the Peninsula was framed. But its formation in that way I take leave to say, to this audience in particular, has been in one sense a real national misfortune to our country. I assert this because I have found, after many

years' study of the subject of Army Reform, that you are constantly met with the objection, "Why do you require Army Reform, when we had so perfect an Army in the Peninsula?" It is hardly necessary, however, now-a-days (although it was necessary not many years ago even in this room) to defend the study of strategy, of tactics, of the various parts of military science, one by one. But although this is not requisite now, at this point of our remarks it cannot be too often or too clearly declared that there never will again—by any possibility—be given to an English General anything like the time which Wellington had wherein to frame an Army. It is simply hopeless to expect or reckon on it. Without supposing what our friend Blackwood has this month in a very striking picture of an ideal invasion—that our fleet might be swept away at the very outset of a war—it is not to be imagined that there will be seven years, or three, or even one year granted us in which to form an Army out of the raw material. I hope in this country that there will never again be the dangerous delusion which existed at the time of the Crimean war, that you had only to pay a number of men to come into the ranks of your infantry battalions, and that you would be able to put them into the field and frame them into a proper organization in front of the enemy, and that in that way you could form at will an Army like the Peninsula Army.

But there is a second way of creating a great Army, and that I take leave to call the Prussian system; a way of building it up carefully by theoretical science in time of peace. If asked why I call it the Prussian system, I reply, because I find it is the Prussian system in my own life-time, and it was the Prussian system one hundred and thirty years ago, at the time of the battle of Mollwitz. I go back to that time because the era of the battle of Mollwitz was one that has been represented afresh in some of its incidents by those in our time. The sudden astonishment of the world at finding an Army so much better than other armies; an Army that had not been much heard of during the preceding peace; an Army that yet had been formed in peace, and whose leaders had had a peace-training principally; this surprise which happened then, has happened again in our day. I speak, of course, not so much of this last war of Prussia against France, as of the war with Austria four years ago.

To illustrate this subject, I have brought a sketch enlarged from the original in a letter of Frederick the Great, found by myself in a work in the Prince Consort's Library at Aldershot, illustrating his first engagement, the battle of Mollwitz. It is an exact enlargement taken from the drawing in his account written to Prince Leopold of Dessau. Above, you see a map of the battle as it really was, intended as a key. You see in the rude sketch of Frederick's something of the character of the man, something, for instance, of his habitual application to French, in the fact that he could not write a single sentence of plain German without bringing a French word into the middle. I must observe that Mollwitz was a battle of which the King had no thorough knowledge as a spectator, for he fled away in the middle of it, and rode straight off for nearly forty miles, a circumstance which his great apologist, Carlyle, freely admits. Let us look at it to-day for a moment, for the sake of

showing how an army was supposed to be arranged at the time that Frederick the Great first came upon the stage of the world; for you remember this was his first battle You find here a number of Prussian battalions, drawn up in two straight lines, each battalion three deep, and nearly touching. On their flanks are cavalry; in front of them their guns. They had no skirmishers thrown out. The Austrians were drawn up in one line four deep, with their cavalry also on the flanks, and their guns in front. That was the then idea of the formation of an army for fighting, the only idea among civilized nations when Frederick took command in the field. It was not supposed to admit of any variety, as we know for this reason. On the morning of the battle of Mollwitz, when Frederick the Great drew near his enemy, who had an Army about equal to his own, he caught the Austrians unprepared, or, as we now say, he surprised them in their cantonments, dispersed in three or four small villages, with one or two miles between each village. There would have been nothing easier for him, according to our modern practice, than to have attacked and beaten them in detail before they had time to concentrate. But it never occurred to him at that time that it was possible to do such a thing. In order to fight, it was thought necessary to draw the troops up in a straight line. Accordingly, he proceeded to do so, and in doing so (he tells us this himself in his letters, for he saw the thing clearly afterwards in his later years) he took some three hours, by which he allowed the Austrians to come out of their villages and form in front of him, and do exactly what he did.

The battle which followed was fought in this wise. The guns began to fire at each other as soon as the lines were formed, about 1,500 yards off. Then the two lines gradually approached, and as they approached, the artillery practically disappeared from the field. At that time the artillery was never thought a very important arm, and here it actually seems to have been lost sight of, for we have no further notice of what became of it. But the infantry lines grew gradually nearer to each other. Then the cavalry began to make charges, the Austrian cavalry coming down from their own left on Frederick's right, and sweeping his cavalry, which was inferior in numbers, clear off the field. So he writes it down himself, marking it on his sketch with a great D, "Flight of our cavalry." He does not mention, by the bye, that with the cavalry the King went off too. The battle was soon left to the infantry, for the Austrian horsemen, even in their success, could not shake the Prussian line. Frederick's infantry had been beautifully trained for those days; they were perfectly drilled at any rate, quite as well drilled as they are to-day. In those days too, as in 1866, they had a better arm than their adversaries. They had steel ramrods, the great military invention of that epoch. The Austrians had wooden ramrods, which were in the habit of sticking in their pieces, and made their loading slow and uncertain.

The consequence was, that the Prussians fired almost as much more quickly than the Austrians did as, four years ago, in Bohemia. As the lines got nearer and the fire became hotter and hotter, the Austrian line began to break: each man trying to get behind his fellow, and

the third man behind him, until what had been a long line was formed into a number of broken fragments, so that the appearance of the battle of Mollwitz towards the end of it was described at the time in words which exactly recall what has been said by a well-known American general of American battles which he witnessed. "At the "beginning our men formed a good rail fence, but at the end of it they "were all posts and no rails." It was just so with the Austrians in 1741; their fence broke up until it became "all posts." And when the gallant commander who fought for Frederick, General Schwerin, saw that was the case, he gave the word for a general charge of the line. There was accordingly a grand and decisive charge; or, in plain words, the Prussians marched steadily onwards, and the Austrians melted away before them, vanishing away to their right rear across a brook, and leaving the ground to their victorious enemy. This was that first battle of Federick's that so astonished the world, because it showed that in time of peace an army could be built up for its numbers superior to any other army that could be brought against it.

This was the first time that great problem had been clearly illustrated in modern times. But Frederick was by no means content with what he, or his father rather, had done. On the contrary, although the war in which he was then engaged, the war in Silesia in 1741—1742, was a very short one, he had time to profit by its lessons. And as he had fourteen years of almost constant peace afterwards, he was enabled to add to what he had had then, a well-trained body of men, a variety of improvements in tactics, the whole of which I need not particularise here. One of the most noteworthy was the formation of horse artillery, guns that could gallop quickly with cavalry. Another, the practice of moving troops lightly over ground, not by the present system of deep column, but by breaking the line for a time into what we call open columns of companies, and marching along until at a given word the whole wheeled into line at once; and so the movement could be effected by a very long line without that great difficulty which a line moving as a line always has. He made various other improvements in tactics. He taught his men to occupy ground in the proper sense of the word. He did not think it necessary, in order to place his army in battle array, that there must be a long piece of clear level plain, but instructed his officers how to take ground as it presented itself, and occupy it in the best possible way. The consequence of his fourteen years' training and practice and thought and care was, that when he was suddenly plunged into war with almost the whole of Europe—the Seven Years' War, begun in 1756—with no ally but England, and that ally a great way off, he proved a match for all his foes. He beat the Austrians; he beat the French; he beat the allied German States; he beat the Russians, in succession. He went from one army to the other, fighting it, and usually getting the better of it; then flying off to fight another army. And thus he carried on to a successful end that Seven Years' war in which Prussian greatness was first built up.

His success was that of a man of a powerful intellect not one of genius perhaps, but still of a remarkable mind, carefully considering and then working out and studying what he had seen in a very short campaign,

and applying this to a well-trained, well-disciplined army. The strategy of his time was a different sort of strategy from that of the present day, for two reasons. First, because of the physical difficulty that then existed. There were few good roads, not to mention railroads, and very few canals. The rivers were more impassable than they are now, often having marshy banks where now no marsh exists. Where you now see a well-drained set of meadows, in Frederick's days it was often a treacherous swamp. The country being less cultivated in most parts of Europe, and the population being smaller, Europe was less productive than it is now. All these circumstances made it really physically much more difficult to move an army from one part of Europe to another in his time than in Napoleon's. In addition to this cause, there was the moral belief derived from the long experience of a set of indifferent Generals who had gone before his time, that it was very difficult to get armies to move distances, and that you could not move them very far without having a set of magazines planted parallel to the frontier to be crossed. A complete base of supply must thus be extended in every case to within easy distance of the strip of territory to be occupied. The army must not move more than a few miles from that line of magazines. And if it was necessary for the army to go forward once more, there must be another set of magazines prepared further on. These two things, the real difficulty and the mental difficulty arising from long routine and practice, combined to make movements off the battle field singularly confined and slow as compared with what they are now; and made the strategy of Frederick's day perfectly feeble as compared with the strategy of Napoleon, not to speak of that of Von Moltke.

There was no change of importance in tactics from those that Frederick left down to the time of Napoleon—that is, from 1763, when the Seven Years' war closed, until Napoleon came to be known as a Commander-in-Chief. Nor was Napoleon's genius much shown in tactics. His mind was essentially a strategical one. That is—to try to get out of professional phraseology as much as possible—he possessed above all men the power of combining; the power of observing what different men had done, what they had seen, and what they said about it, and bringing all the material together into the focus of his own single mind, and using it to the greatest possible advantage. That was the character of Napoleon's mind. He had, no doubt, an almost universal genius; but it was in strategy, in the higher parts of the art of war, that he especially shone. As to his tactics, he was very well content with what he found; for he was put at the head of armies that had been fighting constantly for years before he took the charge of them. He held no chief command until 1796, and some of the French soldiers had been then campaigning ever since 1792. All his troops had been in the field; the officers were experienced; their men, although in a rough way enough, were thoroughly inured to war. They had developed among themselves by a sort of natural selection—I am compelled to use that word again—peculiar tactics, unknown before their day, the so-called "column with skirmishers." It is in great part that of our own Army at the present day, this formation, and it suited Napoleon very well for his purposes. By the aid then of the tactics

which he found prepared to his hand, and of soldiers whom he received from others ready made, he was enabled to accomplish the marvellous problems of strategy which he devised for his own aggrandisement and that of France.

Napoleon apparently never afterwards had time to turn his mind to the subject of tactics, or to the internal economy of an army. Certainly it is a fact that if he had time he never did so, with one exception—the famous camp at Boulogne. It is well known that at that place Napoleon formed an immense camp with the intention of invading this country, in 1805, and bringing together a great mass of men, put them under some sort of training for a great many months; and until long within my own lifetime, it was always assumed that because Napoleon thus brought a number of men together under well-known officers, therefore he taught them a vast deal at this camp of his. But, happily, we have not many years since had a book published by the Duc de Fezensac, which completely explodes that illusion. There was nothing done at the camp of Boulogne at all in the way of tactics, improvement in drill, or any one of those things which we now hold to be necessary at Aldershot. What was done was this:—the same regiments were kept in the same brigades; the same brigades were put into the same divisions; the same divisions were put under the same General of a Corps that was to lead them in the field. The consequence was, that when the Army moved every man knew the officers in command over him, and every higher officer knew the good qualities and the failings of those below him on whom he had to rely for carrying out his orders. With the Army formed at Boulogne, Napoleon, in rapid succession, rushed on to Ulm and Austerlitz, and overthrew the Austrians, who had improved their Army considerably, and the Russians, who had improved their Army slightly; and then turned back on the Prussians, who had not improved their Army at all since the days of Frederick the Great. These last he defeated utterly in the double battles of Jena and Auerstadt, fought on one fatal day which the Prussians have good cause to remember, for it ruined for the time the monarchy built up by Frederick the Great, and destroyed the *prestige* of his army, which they had fancied not to be improved upon.

The Prussians, observe, had kept during the many years before Jena to the Frederick model. There is very plain historical reason for their not sharing the lessons of the time. They had avoided war as much as they could, and having rushed into it with revolutionary France in 1792 rather needlessly, had drawn out of it very quickly, and left the Austrians and the rest of the Germans to fight out the battle with the French as best they might. They shut themselves out of the general politics of Europe, in fact, for the time. Meanwhile they did not maintain the practical spirit of the tactics of Frederick in his better years, but they contented themselves with the parade-ground practice of Frederick in his later time. The consequence was, that when Napoleon suddenly turned to pick a quarrel with them in 1806 (for if you intend to go to war with a neighbour it is ever an easy matter to pick a quarrel with him), they were—though they did not know it—totally unprepared to face him. How unfitted their Officers

were for the kind of problem they had to deal with may be shown by a single anecdote. General Ruechel, the well-known Commander of the Prussian right wing in the campaign and battle of Jena, saw a Staff Officer gallop up to him. "Sir," he said, "there is a French "column turning your left." "Sir," said the General, I do not look "to the left, nor do I look to the right; I go right on and beat the "enemy." The General was killed that day; many other officers fell at the same time, as a sacrifice to the past reputation of their army, as Prince Louis, one of the Royal house, had fallen at Saalfeld three days before.

I refer to the action of Saalfeld for two different reasons. First, because it shows, in the lighter distribution of the Prussian troops, the superior management of their artillery, now formed into regular batteries, and their attempted occupation of commanding points, the improved condition of warfare which Frederick bequeathed, to that of the days before Mollwitz. And, secondly, it is worth notice because here first the favourite line of Frederick met, and was shattered by the column and skirmisher formation derived by the Grand Army from the revolutionary war. One cannot, indeed, have a better instance of the contact of two totally different orders of battle, or ways of fighting, than this encounter of the column with many skirmishers on the French side, and the line with few skirmishers on the Prussian. Along the centre of a little broken plain ran the Prussian line. By their left was a brook; and as they were afraid of having that flank turned, they had thrown their skirmishers along the brook to cover it, but had kept none in front. While they were doing this, the French commander, General Lannes, the ablest tactician in Napoleon's Army, emerging from a pass opposite their left, took ground gradually along the foot of the hills in front of them, and formed his troops into columns of attack. The skirmishers drew near the Prussian line in an irregular manner. The Prussians were no longer, as at Mollwitz, in one straight heavy line. They had occupied a bit of commanding ground on the right, with a battalion and a battery. They held some rough ground in front of the town of Saalfeld, beyond the left, with riflemen. But though they no longer formed one almost immovable long line, yet still they used a line, especially in their centre formation. The French skirmishers got within shooting distance of the line, and began to fire into it. The battalions in line answered them; but not being protected by skirmishers, had, in fact, no chance at all. Their men were shot down by the half dozen every moment, and before Lannes prepared to charge it with his columns, the line was shaken from one end to the other. Then the French rushed at them, pierced and broke their less solid formation. The Prussian cavalry, ever gallant, ever ready to do the best they could, dashed forward to retrieve the day under Prince Louis, the commander of the army. But the French cavalry, a heavier body, who had been kept in reserve in the valley, came out upon them and charged, and by superior weight and that use of reserves which all cavalry officers agree is more necessary with theirs than any other branch of the service, overthrew the Prussians, and drove them off pell-mell through the village of Wolfsdorf, which lay behind the centre of their late position.

Prince Louis was following the relics of his cavalry through the enclosures outside that village, when a French Sergeant-Major cut him down at a blow, and he fell dead. A monument to his memory was, long afterwards, erected on the very spot where he sacrificed his life to his belief in the invincibility of the old Prussian tactics. So perished a system once rightly deemed excellent, but over which forty years of peace had passed without any desire or study to improve it, and with it fell the kingdom which it was designed to protect, as half a century before, it had protected Frederick's throne, against all mortal efforts.

The tactics which Frederick the Great left behind him, improved vastly, no doubt, from those of the era of Mollwitz, perished in 1806, and vanished thenceforward. There was little change needed in any army but that of Prussia. Prussia instantly adopted the French model. The Austrians were adopting it insensibly before, and even our own country may be said to have adopted it in great part, though our theory had been against it. As a general rule the French formation became, as it has remained down to our own days, the model of fighting for all the armies of the world. There are exceptions to that rule, and they are to be found chiefly in our own country, and in Russia. The English have stuck to the line formation longer than other nations, for an important historical reason, a reason which Thiers uses with great effect in one of his works. He says that all our battles abroad on the Continent were defensive, and therefore suited to our line tactics. They were not all so: some of them, as Salamanca, were thoroughly offensive battles. But he was quite right in saying that many of them were solely defensive, such as Talavera, Vimiero, and other smaller actions in the early part of the Peninsular war. Waterloo, too, is a very illustrous example of a defensive action on our part. If you are sure that you are going to fight strictly defensive actions, the line is doubtless the right formation. But you cannot be sure that you will not have to move your Army, and it is when moving that the line formation is inconvenient, although not so when receiving an enemy. The English then, because most of their battles were defensive, naturally adhered longer than other nations to the line formation.

Neither have the Russians followed the French very closely, having adopted a special system of massing their men into deep columns on a small space of ground. The question has often been asked why the Russians have suffered proportionately more than other nations in particular battles, such as Borodino and Balaclava. It is simply because their troops were massed together in this overcrowded manner; and the reason is to be found in the genius of the people, and their political training. Their soldiers were serfs who would fight bravely up to a certain point, but they would not fight except under the eyes of their Officers, and hence it was necessary to mass them together.

The French model having been adopted by all nations, though with these exceptions, continued to be the model down to the time of the campaign of Solferino, in 1859. Of this I shall say very little, because

a great military critic, whose reputation is not English only, but European,—I refer of course to Colonel Hamley,—has noticed specially in his well-known work the three battles of Austerlitz, Waterloo, and Solferino, and shown plainly that though there are distinctions in the mode of fighting employed in those three battles, there is no vital difference whatever; the same principles prevail throughout. Fortified by this remark, I may assert safely that there was no great change in tactics down to the time of Solferino. Let us, however, say a few words upon the history of the campaign of 1859 before passing from it.

As to the strategic powers of the Emperor, as illustrated by the campaign of Solferino, the truth appears to be briefly this. There was one great strategic movement made and no more, and that was the operation which culminated in the arrival of McMahon on the Austrian right flank at Magenta, and resulted in the defeat of the Austrians and the success of the French in that first great action. But it should be added that at the beginning of a great campaign to win one great success is a most important matter, not merely in the actual effects of the success itself, but in the moral effects which follow. The winning of Magenta had undoubtedly something to do with the winning of Solferino afterwards, though here there was no previous strategy to admire. As to the tactics at Solferino, viewed analytically, there was rather more skirmishing, no doubt, than at the battle of Austerlitz. The skirmishers fought somewhat more loosely and freely. Further than this, the rifled guns of the French fired over the heads of the Austrian first line and injured their reserves, or at least frightened them, which comes to much the same thing in battle. Yet there seems to be, as before stated, no really important difference between the great battles of 1805 and 1859, fought between the same nations.

We have now reached the year 1860, and we turn naturally to ask what was Prussia doing during all this time and in the years that immediately followed, in the Italian war? In that year 1860, just twelve months after Solferino, took place the celebrated meeting of the present Emperor, then Prince Regent of Prussia, with his beloved brother and ally, Francis Joseph of Austria. I saw them together in the little streets of Toeplitz at one of the most interesting historical meetings of all that are recorded in modern history. The Prince Regent's mind was then full of one idea, how Prussia and Austria were so to combine together as to resist this unconquerable, this tremendously aggressive power of France. But whilst that meeting was going on Herr Dreyse, who is but lately dead, was arming the whole of the Prussian Army with the needle-gun; and the Prussian staff had already begun to study the lessons of their great teacher, Clausewitz, from whom they derived nearly all the vital principles of the system they have been carrying out since. And not they only, for the whole of Bismarck's policy for many years is but carrying out into action one single maxim which Clausewitz taught, namely, that war is but the accomplishing, by a rough-and-ready means, some portion of the national policy; it is in fact the national policy conducted by a special agency. That must have been understood in the general before Clausewitz wrote it, but it was never put into so plain words before. It gives

the key to the whole of what Bismarck's policy has been for the last ten years. We have only gradually learned in England what was being done by our great continental neighbour and old ally. Bit by bit there came upon us the knowledge that the Prussians had devised a new Army Organization, of which we had heard very little at first; she had formed new tactics also; and her armed force was thoroughly prepared in every detail for service. It was not until after the campaign of 1866 had taken place, and Austria had been suddenly and fearfully overthrown, that we found out there had been changes made by Prussia during peaceful years in organization, in administration, in tactics, in armament, and in strategy, such as the world never saw before. The changes as to organization were not wholly original. The Prussians have been carrying out, only more completely and in a more perfect way, what the French had done before them in the great reform of General Moreau, adopted by General Bonaparte before he became Emperor, the creation of Army Corps. Probably there are many in this room who do not fully understand what this formation of Army Corps implied. It is not the number of men or the proportion of different arms that is the vital point. There is something higher than these which constitutes the idea of an Army Corps. It is this, that the General of an Army Corps is completely and entirely responsible for all the interior management of that part of the whole army to which he belongs. In other words, if a Commander-in-Chief divides a large Army into three or four or ten Army Corps, he gets rid of all the petty and harassing details of economy or of administration, which if he attempted to load his mind with them, would, in the case of most men, certainly tend to break him down. It is not solely, as some writers say, that Napoleon did it because it was easier to move an Army across country in complete corps than as a mass or in chance fractions. It was a new division of his responsibility which he, as Commander-in-Chief, adopted. Moreau, although he was the first to create this change, did not carry it out logically and fully, for he kept one corps under his own personal charge. Wellington did the same. When he, in his last and most striking campaign, fairly formed his army into corps, he still kept one under his own administration, which, like Moreau, he called the Reserve Corps.

But the Prussians have carried this important principle infinitely further. Following out the maxims of Clausewitz, as propounded in his warlike philosophy, they have subdivided their responsibility out so completely in time of peace, that when war comes all they have to say by telegraph is—"War is declared! prepare!" and everybody makes ready at once in the right way up to the limit of his power. Of course, to do this needs a certain expenditure for material at first. It needs, to take one strong example, that every commander of a regiment must have with him a great number of carriages only wanting the horses to move them, and should know where to apply for the horses. And it implies another thing besides expenditure of stores, a change of system in a whole army, by which, instead of personages in high office striving to get every paper referred up to their own tables to be there, if possible, decided upon, they put as many things as they

can fairly away from them, and make their subordinates responsible for their proper work, by steadfastly discouraging all *unnecessary* appeals to higher authority. That is one point which is put with wonderful force and plainness in the Archduke Albert's famous essay on Responsibility in Time of War. He is merely recommending, in a philosophic spirit, what has been practically done by the Prussians. That essay is so memorable because in it a great practical soldier comes forward to invite a thorough change in the ideas of military men of the older type, and shows the true principle on which great Armies should be organized in peace, so as to be ready in time of war. That principle is its key note; and the same broad principle of the subdivision of responsibility forms the whole explanation of the renewed spirit of the Prussian military administration. Then, with their system of localising their troops, it becomes perfectly simple to organize not upwards but downwards, down to the local battalion, the unit that even a common-place Officer can fairly be left to deal with.

As to the Prussian strategy, a very remarkable change took place in 1866, which has been very beautifully illustrated—beautifully I mean in the scientific sense—in the recent wars. Strategy no longer consists in having one line of operations with a base from which the Army should work; because the Prussians have found out the secret of making their whole country by superior organization, one great base of operations, and so of bringing masses of men into the field that cannot be moved by any one line or handled as any one Army. They, therefore, have devised a new set of rules for strategy, which may be formulated thus:—

When a nation is about to contend with its neighbour, it should be organized in a military sense throughout, so that the whole country forms the base. The army is got ready by corps or integral parts of some sort on the side of the base nearest the enemy. It is then formed, for convenience of handling, into several different armies under different leaders, and these are moved by separate lines on a common object in an enemy's country. The danger is obvious that one of these separate bodies might be discomfited while waiting for the others. It is needful to guard against this by so moving the armies that they may, as far as possible, be within supporting distance of each other, at least at such junctures as when the enemy can throw a mass against one of these. Thus, in 1866, the Prussians entered Austria with three armies, two of them under Prince Frederick Charles and Herwarth immediately joining, and the three concentrating to defeat the Austrians at Königgrätz. On entering France again in 1870, they had three armies. Again did one, that of Steinmetz, join the central force under Prince Frederick Charles, as they entered the enemy's territory. The third, that of the Crown Prince, was, as in 1866, kept purposely strong enough to be independent. In short, they were prepared in either case, had Benedek or Napoleon III been a strategist, to meet his strategy with a counter-blow.

I pass from Prussian strategy to speak once more of Prussian tactics as developed in time of peace. Whoever wants the key to modern Prussian tactics, can get it in two different ways. The *Tactical In-*

structions, which is the official book, translated for us by Sir Charles Staveley, gives us a key to the management of tactics in its proper division among the proper persons. The principle in that book is a new principle in war, but it is exactly the same principle I spoke of just now when referring to organization and administration. It is to presume that men who are entrusted with separate charges have some sense, some discretion, some moral courage, and to hold them responsible for the full exercise of those faculties; to give them merely general instructions as to what they should do, enlightening their minds as to the principles on which they ought to act; and then to leave them to themselves under a merely general supervision. The *Tactical Instructions* apply this broad and novel principle to all parts of the Army. But the *Tactical Retrospect*, the most remarkable of modern military essays, criticises what was done by all parts of the Army when they were suddenly, having first had the immense advantage of careful organization in time of peace, brought in face of the enemy in time of war. Yet even the *Retrospect*, candid as it is, does not tell us as plainly as it might do, that the Company Column of the Prussians, which is supposed, with the best reason, to have been of such advantage to them of late, had existed among them nineteen years before it was forced into general use from its extraordinary adaptation to the wants of their Army in the field. The *Drill Book* of the year 1847 was the first that contained it; and from that moment there was nothing to prevent any man commanding a battalion in the field from using this now familiar Company Column. But the battalion Officers did not like adopting this great innovation as the ordinary practice. They fancied, with some reason, it stripped them of a good deal of their authority to vest it in the captains, and so they put it off as long as they could, which was until they came into the field in 1866. Strange to say, in the year before, Moltke, watching this tendency, gave a warning to the Prussian Army in an essay on the improvements in firearms, that as they were henceforth to use arms of precision in the open field, they must learn to use these Company Columns, or they could not reap the full advantage of the breech-loader.

A late Prussian writer, who takes the present singularly inopportune time of introducing a new work on the now old war of 1866, and who is publishing an excellent account of its campaigns (not yet complete by the bye, they being somewhat slow in these matters in Prussia), says that the battle of Kissingen is the most important of the whole war. I cannot say that I agree with him; but happening to have the advantage of knowing the ground very well, I have selected that particular action for illustrating the use of the Company Column. The little town of Kissingen lies on the east bank of the River Saal, with a stone bridge leading into it across the stream. That bridge was strongly barricaded, and flanked with artillery fire by the Bavarians, who held the town with all that side of the stream, being in less force, however, than the Prussians. On the morning of the 10th July, 1866, the Prussians were seen coming down with their columns from the hills on the opposite side of the river, throwing out their skirmishers on every side, and looking for a passage. It was rather late in the day,

for they had made a long march—a good day's walk for an active man—from Brückenau, high up in the Fulda mountains. They wanted to win the passage that afternoon before the defenders were reinforced. They reconnoitred the stone bridge leading into the town, but found it so well protected that they did not like to force it by open attack. So, while they kept up an animated fire with their skirmishers along the stream, they sought for other passages above and below. About three parts of a mile below the town, there had been a little footbridge, a mere toy in its way, which had existed until a day or two before for the sake of summer loungers in the pleasure-grounds. It had been broken up hastily by the Bavarians, who had taken off the boards, but had left the piles standing. The Prussian soldiers saw this. Their pioneers rushed into a house close by, tore up the floors, laid them on the planks, and in a few minutes their passage of the Saal was begun. As one company crossed, that formed on the other bank into its column and went on. As another company followed, the first took ground to the right, further from the stream, and facing upwards towards the town and the inclosures about it held by the enemy. They came without any guns, but soon spread their skirmishers across the open ground outside and behind the town, their supports constantly extending behind the skirmishers in the rough-and-ready way which their new tactics allow. The Bavarians, covered behind walls, shot many of them down. But the Prussians being stronger in numbers, closed gradually in upon the town, turned it by threatening the retreat of the defenders eastward, and so forced the Bavarians out. That was the whole of the battle of Kissingen, which was over in a couple of hours (if we except some stands made by the Bavarian rear guard later), and it is a very good illustration of the handiness of these new light columns.

What the *Retrospect* has told us of the infantry, their deeds and their omissions in the war of 1866, it has told us also of the cavalry, the artillery, and the engineers. It related most freely and frankly the shortcomings of each branch. So impartially, too, was this done, that a well-cultivated soldier, not long ago, made the remark that he could not conceive to which branch of the service the writer belonged. He is well enough known now that he is dead; for Captain May, the gifted author, was killed this winter in the north of France. He has not been well used by his countrymen. His work is said to have retarded his professional promotion, and done him injury with his own cloth; and yet in this particular war in which he was killed, so closely did his countrymen follow the criticisms which he gave them of the previous war of 1866, that it has been truly said that if you were to have printed his remarks in the *Tactical Retrospect* on the use of artillery and cavalry, and handed them to the Prussian officers on entering the late war, they could not have followed out those criticisms more exactly than they did.

But before this, the training of real service in Bohemia gave the infantry what the nineteen years of the "Drill Book" had not done, the free use of their weapons and of modern skirmishing by the long-neglected Company Column which was now constantly employed. The advantage

lately gained in another arm was simply this. The Prussian cavalry by their action in front of the army in 1870, instead of keeping behind it as they did in 1866, enabled the generals to complete their enormous strategic combinations by successfully advancing armies to the different points required on different lines. To put it in another way, had not the cavalry of the Prussians been active in front of their armies last August when they came through the Vosges into France, it would have been impossible for the Crown Prince to know what Prince Frederick Charles and General Steinmetz were about. Nor could he have known, but for this activity, that his front was clear of the French after the battle of Woerth. A very distinguished officer was heard to say a few nights ago in discussing this question, that the French infantry ought not to have run away and left the ground clear for the enemy's horse, and that if they had not so run away, the Prussian cavalry could not possibly have overrun the country. Perfectly true it is that this would have been so. But as a fact they did make a general retreat, which could not have been known at once if the cavalry had not gone forward to look for them. Again, the Crown Prince would not have known that the corps of De Failly had retreated from his flank without an effort if his cavalry had not been well in advance, and his movements through the difficult passes of the Vosges must have been greatly lightened by this knowledge. So throughout the war the cavalry, by this extraordinary activity of theirs, of which they showed no trace in 1866, completed the strategic means which Von Moltke wanted to his hand. If you watch—to take a few more instances—the details of the passage over the Moselle, when Bazaine was about to be shut up in Metz; how carefully the cavalry covered with a sort of net-work the movement of the whole Prussian Army, so that the French never found them out until they got to their own side of the river; how the cavalry pushed on until they cut in on the flank of the retreating French and made them turn, and give time to the infantry to come up; how the artillery, when the infantry could not be got to the ground in the battle of Mars-la-Tour which followed, left their infantry behind and came up at a trot with very heavy guns miles in front of them to stop the French until the foot could arrive; how the cavalry there made very desperate and very bloody charges, useless charges they would have been if they had not been necessary to stay the French a little longer; then one understands how each of these arms have profited by the sharp lessons that they had before, the hard lessons of the war of 1866, which they had seen practically, and the severe criticisms which they had studied in poor May's famous pamphlet, which many of them were little disposed to praise when he was still among the army which owes him so much.

I have nearly done. As I said before, it is not necessary to make any defence now-a-days to those who care for our profession, of that careful study of that profession which the Prussians, above all, have taught us. The old charge of pedantry and theoretical teaching is vanishing, though we still sometimes hear the muttering of the storm in the distance. The accusation against us now-a-days comes from a different quarter than that of some old officer with fixed ideas, and takes a new form altogether

If a man takes to the study of his profession, and does his best to encourage his comrades, in rather a louder voice perhaps than others, to show the army what it ought to be, he is accused by our Destructive Philosophers of cold-bloodedness. One of those writers who wanted us lately to go to war with Germany and the world generally, without having any army to do it with, tells you that he objects more to the cold-blooded strategist who studies in the closet what war should be, than he does to the typical military man who is supposed to swagger on the parade. If that be the cold-bloodedness which he attacks, I think we are in very good company, we soldiers who come under his censure. For surely, when the doctor follows the knife of the anatomist through the dead body in order to discover what were the exact causes of death, and uses his new knowledge for his proper purpose, in this sense he is very cold-blooded indeed. When the constitutional lawyer dives into the ancient usages of different countries, and goes over even to India to study the ancient village laws, in order to found deep our own legislation, or to assist its working in the courts of law, he too must be called cold-blooded. The theologian, when he studies the springs of human conscience and action and feeling, in order to make the pulpit effective in its action upon the human heart, is similarly, but more heinously cold-blooded. And, above all, the statesman when he follows the current of the feeling of his time high and low, and studies not only what the rich and the powerful think, but what the poor and oppressed feel, in order to guide himself in his legislation, is above all cold-blooded. In that sense I hope they will continue to be cold-blooded, and the professional soldiers with them. I am not afraid of this particular critic or of the doctrines such as he teach. I am willing to leave to his visionary creed that distant future when we are told soldiers will not be necessary, nor indeed any doctors, nor lawyers, nor least of all, any statesmen. I cannot help remembering myself that Christianity has much more practical subjects than that far-off time to deal with, and that it views them in a much more practical way. Christianity, when it first came upon earth, and looked for its first convert from heathenism, sought and found it in whom? In one Cornelius, a professional soldier, a captain quartered with the regiment called the Italian, on the coast of Syria eighteen hundred years since I confess myself content to belong to the profession which Cornelius followed, and the religion that he embraced.

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